

Rebecca W. Arnold, President Sara M. Baker, Vice President John S. Franden, Commissioner Carol A. McKee, Commissioner Mitchell A. Jaurena, Commissioner

August 6, 2012

TO:

Holders of the ISPWC

FROM:

Dale Kuperus, P.E.

Manager, Design & Construction

SUBJECT:

Adoption of the 2012 ISPWC

At the August 1, 2012 meeting the ACHD Commission formally adopted the 2012 ISPWC and the 2012 ACHD Supplements to the ISPWC.

These documents can now be used for work within the jurisdiction of ACHD.



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ACHD Supplement to the 2012 ISPWC

June 2012

Division 100 – General Conditions

This Division shall be deleted in its entirety.

Division 200 - Earthwork

- Section 201 Clearing and Grubbing and Removal of Obstructions, Part 3-Workmanship Section 3.1-CLEARING AND GRUBBING, Paragraph A.5.c, Page 2. The paragraph will be modified to read as follows:
 - Before the contractor leaves the site, all existing trees which have been significantly damaged due to construction activities shall be replaced or repaired with Engineer's approval be a certified arborist at the expense of the Contractor.
- Section 201 Clearing and Grubbing and Removal of Obstructions, Part 3-Workmanship Section 3.2-REMOVAL OF OBSTRUCTIONS, Paragraph A.4, Page 4. The paragraph will be modified to read as follows:
 - Satisfactorily restore any damage to existing facilities or structures resulting from activities by the Contractor to their original condition at the Contractor's expense.
- Section 202 Excavation and Embankment, Part 3.9-CLASSES OF COMPACTION AND DENSITY REQUIREMENTS-Paragraph D, page 13. The first sentence will be modified to read as follows:
 - Place material above subgrade that is **too** granular to test in layers no more than 9 inches and compact with a minimum of 12 full coverages of a vibratory roller.
- Section 205 Dewatering, Part 1.4-SUBMITTALS, Page 1. The following will be added:
 - B. Idaho DEQ Dewatering Permit

Division 300 – Trenching

- Section 306 Trench Backfill, Part 2- Materials Part 2.2 Native Trench Backfill Material, Page 2,
- Section 306 Trench Backfill, Part 3- Workmanship Part 3.3 Type A-2 Compaction, Page 5. The following shall be added:
 - At the Engineer's/Owner's Discretion.
- Section 307— Street Cuts and Surface Repairs, Part 3.9- Type "P" Surface Restoration (with Pavement Restoration), Page 6. This section shall be deleted in its entirety.

- Section 307— Street Cuts and Surface Repairs, Part 4- Measurement and Payment Part 4.1.A, Page 9. The modifications are as follows:
 - Bid Schedule Payment Reference: 307.4.1.A.1
 Bid Schedule Description: Miscellaneous Surface Restoration (Landscaping).... (SY)
 - Bid Schedule Payment Reference: 307.4.1.A.3
 Bid Schedule Description: Miscellaneous Surface Restoration (Sod).... (SY)
 - 3. Bid Schedule Payment Reference: 307.4.1.A.5
 Bid Schedule Description: Miscellaneous Surface Restoration (Pasture).... (SY)
 - 4. Bid Schedule Payment Reference: 307.4.1.A.7
 Bid Schedule Description: Miscellaneous Surface Restoration (Natural Ground).... (SY)
- Section 307

 Street Cuts and Surface Repairs, Part 4- Measurement and Payment Part 4.1.F, Pages 10 & 11. The modifications are as follows:
 - 1. Bid Schedule Payment Reference:307.4.1.F.1
 Bid Schedule Description: Main Line Type "P" Surface Restoration (Asphalt Roadway)..... (SY)
 - 2. Bid Schedule Payment Reference:307.4.1.F.3
 Bid Schedule Description: Main Line Type "P" Surface Restoration (Asphalt Roadway with Fabric)..... (SY)
 - 3. Bid Schedule Payment Reference:307.4.1.F.5
 Bid Schedule Description: Service Line Type "P" Surface Restoration (Asphalt Roadway with Fabric)..... (SY)
 - 4. Bid Schedule Payment Reference:307.4.1.F.7
 Bid Schedule Description: Service Line Type "P" Surface Restoration (Asphalt Roadway with Fabric)..... (SY)
- Section 307— Street Cuts and Surface Repairs, Part 4- Measurement and Payment Part 4.1.J, Page 11. The modifications are as follows:
 - 1. Bid Schedule Payment Reference:307.4.1.J.1
 - 2. Bid Schedule Description: Gravel Access Road -Type (SY)
- The following Standard Drawing shall be deleted from Division 300 of the ISPWC: SD-303
- The following 2012 ACHD Standard Drawing Revision will be added to Division 300 of the ISPWC: SD-303

Division 400 – Water

No Changes

Division 500 - Sewer

- The following Standard Drawing shall be <u>deleted</u> from *Division 500* of the ISPWC: SD-508
- The following 2012 ACHD Standard Drawing Revision will be <u>added</u> to Division 500 of the ISPWC: SD-508

Division 600 -

- Section 602 Storm Drain Inlets, Catch Basins, Manholes and Gravity Irrigation Structures, Part 4-Measurement and Payment - Part 4.1.H Precast Sediment Box, Page 11. The modifications are as follows:
 - 1. Bid Schedule Payment Reference:602.4.1.H.1A
 Bid Schedule Description: Precast Sediment Box-Size 1000 Gal..... (EA)
 - 2. Bid Schedule Payment Reference:602.4.1.H.1B
 Bid Schedule Description: Precast Sediment Box-Size 1500 Gal..... (EA)
- Section 602 Storm Drain Inlets, Catch Basins, Manholes and Gravity Irrigation Structures, Part 4-Measurement and Payment Part 4.1.0 Irrigation Ditch __wide x __Deep, Page 12. The paragraph will be modified to read as follows:

Bid Schedule Description: Irrigation Ditch – Size ____ wide x ____ deep(LF)

A. The following Standard Drawings shall be deleted from *Division 600* of the ISPWC:

SD-601	SD-608	SD-616
SD-602	SD-608A	SD-617
SD-603	SD-609	SD-623
SD-604	SD-610	SD-627
SD-604A	SD-610A	SD-628
SD-605	SD-612	SD-629
SD-606	SD-613	
SD-607	SD-614	

B. The following 2012 ACHD Standard Drawing Revision shall be added to Division 600 of the ISPWC:

SD-601	SD-606	SD-617
SD-601A	SD-609	SD-627
SD-603	SD-610A	SD-628
SD-604A	SD-616	SD-629

Division 700 -

- Section 701- Concrete Formwork, Part 3.8 Form Removal, Paragraph A, Page 5, shall read as follows:
 - A. Do not remove forms or bracing until concrete has achieved 90% of its design strength to carry its own weight and design loads.
- Section 701- Concrete Formwork, Part 3.8 Form Removal, Page 5, the following shall be added:
 - B. Maintain Cold Weather requirements as outlined in Section 703 Cast -In-Place Concrete
- Section 703- Cast-In-Place Concrete, Part 3.5 Curing and Protection, Paragraph C, Page 13, shall read as follows:

Protect minor structures such as sign foundations, sidewalks, curb and gutter, small irrigation boxes, etc. from freezing by covering with burlap or insulation blankets. Repair or replace freeze-damaged concrete as directed by the Engineer.

- Section 705- Portland Cement Concrete Pavement, Part 2.1 Portland Cement Concrete, Paragraph A,
 Page 2, the following modification shall be made:
 - C. Maximum clump 4 inch or 2 inch when using a slip form method.
- Section 706- Other Concrete Construction, Part 2 Materials, Page 3, the following shall be added:

2.7 Tactile Warning Surface

TWS units shall be manufactured using a matte finish exterior grade homogenous glass and carbon reinforced polyester based SMC composite material as manufactured by ADA Solutions, Inc. of Chelmsford, MA (Phone: 800-372-0519, website: www.adatile.com) or approved equal.

Color shall contrast visually with adjacent walking surfaces, either light-on-dark, or dark-on-light. Methods for construction and coloration must be approved by ACHD prior to construction.

Section 706- Other Concrete Construction, Part 3 Workmanship, Page 5, the following shall be added:

3.14 Tactile Warning Surface

TWS product shall be installed per manufacturer's instruction. To the maximum extent possible, the TWS units shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the ramp. The TWS unit shall be located so that the edge nearest the curb line is 6" minimum and 8" maximum from the curb line. The TWS units shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the TWS unit is flush to the adjacent concrete surface. Upon curing (allow 24 to 48 hours) remove protective plastic covering. Protect TWS unit against damage during the construction period.

 Section 706- Other Concrete Construction, Part 3.9 Finishing, Paragraph C, Page 4, the following modification shall be made:

Light broom **perpendicular** to long dimension

• Section 706- Other Concrete Construction, Part 3.11 Tolerances, Paragraph D, Page 5, the following modification shall be made:

.....or pedestrian ramps or designated pathways.

• The following Standard Drawings shall be <u>deleted</u> from *Division 700* of the ISPWC:

SD-701	SD-706	SD-710A
SD-702	SD-708	SD-710B
SD-703	SD-709	SD-710C
SD-704	SD-709A	SD-714B
SD-705	SD-710	SD-715

D. The following 2012 ACHD Standard Drawing Revision shall be added to Division 700 of the ISPWC:

SD-701	SD-709	SD-710B
SD-702	SD-709A	SD-710C
SD-706	SD-710	SD-714B
SD -708	SD-710A	SD-715

Division 800 -

- Section 810 Plant Mix Pavement, Part 1.2 Related Sections, Paragraph E will be deleted in its entirety
- Section 810 Plant Mix Pavement, Part 2.1 Hot Mix Asphalt Design, Paragraph D will be deleted in its entirety
- Section 814 Superpave Plant Mix Asphalt shall be added in its entirety

SECTION 814 SUPERPAVE PLANT MIX ASPHALT

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. This work consists of constructing one or more courses of Superpave Plant Mix pavement in accordance with these specifications and in reasonably close conformity to the lines, grades, thicknesses, and typical cross section(s) shown in the Contract Documents, or as established.
- 1.2 RELATED SECTIONS
 - A. Section 803 Plant Mix Aggregate
 - B. Section 805 Asphalt
 - C. Section 806 Tack
 - D. Section 810 Plant Mix Pavement

1.3 REFERENCES

- A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing
- B. WAQTC Western Alliance for Quality Transportation Construction

PART 2 MATERIALS

2.1 CLASSIFICATION

A. The Superpave HMA shall be composed of a combination of aggregate, mineral filler (if required), and performance graded (PG) asphalt binder material. The Contractor shall furnish a job mix formula (JMF) and a HMA pavement that complies with the following requirements. Any JMF dated more than 1-year from the date of submittal will either require updated specific gravities from the original crush, or a new JMF. Updated specific gravities shall not alter the JMF target values out of tolerance; otherwise a new JMF will be required.

2.2 AGGREGATE & MIX DESIGN REQUIREMENTS and PRODUCTION LIMITS

- A. Aggregate for all mixes, except SP1 and SP2, as a minimum shall be provided in two separate stockpiles. Aggregate shall be crushed stone or crushed gravel of such gradation that when combined with other required aggregate fractions and fillers, in proper proportion, the resultant mixture meets the gradation required under the composition of mixture for the specific class under contract.
- B. The fractions for the mixture shall be sized, graded, and combined in such proportions that the resulting blend conforms to the grading requirements as defined in Table 1 below.
- C. Aggregates shall meet the requirements of Section 803 Plant Mix Aggregates with the exception of Table 1 through 4.

Table 1									
	SUPERPAVE AGGREGATE DESIGN BANDS and VMA TOLERANCES								
SIEVE SIZE	N	IOMINAL MAXIMUM SIZ	E						
	3/4 in.	1/2 in.	3/8 in.						
		PERCENT PASSING							
1 in.	100								
3/4 in.	* 90-100	100							
1/2 in.	75-90	* 90-100	100						
3/8 in.	* 52-80	75-90	* 90-100						
No. 8	* 23-49	* 25-58	* 32-67						
No. 200	* 2.0-8.0	*2.0-10.0	* 2.0-10.0						
VMA, % Minimum	13.0	14.0	15.0						
PRIMARY CONTROL S	SIEVE (PCS) CONTROL PO	INT FOR MIXTURE NOMI	NAL MAXIMUM AGG						
	SIZI	= ** -							
Primary Control Sieve	No. 4	No. 8	No. 8						
PCS Control Point (% passing)	47	39	47						

^{1. *} Denotes the sieves that will be used for mix design control points and quality analysis sieves for Class SP1 & SP2 mixes.

2. ** The combined aggregate gradation shall be classified as coarse graded when it passes below the PCS control point as defined in table 1. All other gradations shall be classified as fine graded. (This classification is based on the Contractors JMF and not individual gradation tests.)

Table 2										
SUPERPAVE DESIGN REQUIREMENTS										
Minimum Use	Tempora	ry Paving	Local Roads	Arteria	ls & Collecto	Roads				
Quality Characteristics	SP1	SP2	SP3	SP4	SP5	SP6				
Design ESALs (million)	< 0.3	0.3 - < 1	1 - <3	3 < 10	10 - < 30	≥ 30				
LA Wear – AASHTO T- 96, Max % loss	40	35	30	30	30	30				
Fractured Face - 1 fracture/2 fracture, % Min	50/-	65/-	75/60	85/80	95/90	100/98				
Uncompacted void content of fine agg, % Min		40	40	45	45	45				
Sand Equivalent, % Min	35	35	40	45	45	50				
Flat & Elongated, % Max		10	10	10	10	10				
Gyratory Compaction Gyrations for Ndes	40	50	75	90	100	125				
Relative density, %Gmm@Ndes	96.0	96.0	96.0	96.0	96.0	96.0				
Voids Filled With Asphalt, % VFA	70 – 80	65 – 78	65 – 75	65 – 75	65 – 75	65 – 75				
Dust to Binder Ratio Range, DP	0.6 – 1.4									
Absorption,% Max			2.0)						

Table 3 SUPERPAVE PRODUCTION REQUIREMENTS								
Quality Characteristics SP1 SP2 SP3 SP4 SP5 S								
Asphalt Binder, % PBe	C-JMF Value ± 0.4							
Gradation on Agg from Extraction	Per Table 4							
Air Voids, % Va	-			4.0) ± 1.0			
Voids in Mineral Agg, VMA			Per Table 4					
Density, %			92	2 - 96				

Table 4 SUPERPAVE AGGREGATE GRADATION & VMA TOLERANCES - PRODUCTION							
SIEVE SIZE	IEVE SIZE TOLERANCES FROM JMF						
	3/4 in. 1/2 in. 3/8 in.						
1 in. – No.4	± 6%						
No. 8 – No. 30		± 5%					
No. 50 – No. 100		± 4%					
No. 200	± 2.0%						
VMA, % min	13.0	14.0	15.0				

- 1. Please see ACHD's QC/QA table for sampling requirements
- 2. Tolerances cannot be outside of design band

2.3 ASPHALT

- A. Asphalt Binder shall meet the requirements of Section 805 Asphalt.
 - 1. Asphalt to be of the type and grade called for in the Contract Documents.
 - 2. Asphalt will be accepted at the point of delivery.
 - 3. Unless otherwise permitted, all asphalt for a specified project shall be furnished by one (1) supplier. If a change of supplier for asphalt is proposed, or if blending of plant mix asphalt from more than one supplier is proposed, mix design testing and verification are required as conditions of approval.

2.4 ANTI-STRIPPING ADDITIVE

- A. Anti-stripping additive shall meet the requirements of Section 810 Plant Mix Pavement, 2.4 Anti-Stripping Additive.
- B. All Superpave Plant Mixes shall use a minimum 0.5% approved liquid anti-stripping additive by weight of asphalt.

2.5 TEST METHODS

- A. Sieve Analysis of Fine and Coarse Aggregates AASHTO T 27.
- B. Materials Finer than No. 200 sieve in Mineral Aggregates by Washing -AASHTO T 11.
- C. Preparing and Determining the Density of HMA Specimens by Means of the Superpave Gyratory Compactor AASHTO T 312.
- D. Percentage of Fracture in Coarse Aggregate AASHTO TP 61.
- E. Plastic Fines in Graded Aggregate and Soils by Use of the Sand Equivalent Test –AASHTO T 176.
- F. Flat and Elongated Particles in Coarse Aggregate ASTM D 4791
- G. Theoretical Maximum Specific Gravity and Density of HMA Paving Mixtures AASHTO T 209.
- H. Bulk Specific Gravity of Compacted HMA using Saturated Surface-Dry Specimens AASHTO T 166.
- I. Sampling Bituminous Paving Mixtures AASHTO T 168.
- J. Sampling Bituminous Materials AASHTO T 40.
- K. In Place Density of HMA WAQTC TM 8.
- L. Determining the Asphalt Binder Content of HMA by Ignition method AASHTO T 308.
- M. Bulk Specific Gravity of compacted HMA mixtures using saturated surface-dry specimens AASHTO T 166.
- N. Mechanical analysis of extracted aggregate AASHTO T 30

PART 3 WORKMANSHIP

3.1 Workmanship shall meet the requirements of Section 810, Part 3. Including, but not limited to, mixing plant, sampling devices, all equipment, recycled plant mix (RAP), paver, rollers, mix design approval and weather limitations and cutoff dates. Pavement shall be compacted to a range between 92% - 96% of the theoretical maximum value from the JMF.

PART 4 MEASUREMENTS AND PAYMENT

- 4.1 Measurement and payment shall meet the requirements of Section 810, Part 4 and unless otherwise specified in the contract documents, acceptance of the Superpave plant mix and the incentive/disincentive payment will be in accordance with section 4.2.
- 4.2 Acceptance, Pay Factors & Incentive/Disincentive Payment. For projects not funded by ACHD, a pay factor of 1.0 will be used, and material failing to meet the project specifications will be subject to rejection, an extended warranty, or a fee.
 - A. Mix Characteristic Acceptance and Pay Factors

Determine the arithmetic mean, \overline{X}

$$\overline{X} = \frac{\sum x}{n}$$

Where

 Σ = Summation

 x_i = Individual test value

n = Total number test values

Compute the sample standard deviation, (S)

$$S = \sqrt{\frac{\sum (x_i - \overline{X})^2}{n - 1}}$$

Compute the upper quality index (Q_u) .

$$Q_u = \frac{USL - \overline{X}}{S}$$

Where *USL* = Upper specification limit.

S = Standard deviation

$$Q_L = \frac{\overline{X} - LSL}{S}$$

Compute the lower quality index (Q_L) .

Where LSL = Lower specification limit.

S = Standard deviation

Determine P_U (percent within the upper specification limit, which corresponds to a given Q_U) from Table7. If a *USL* is not specified, P_U will be 100.

Determine P_L (percent within lower specification limit, which corresponds to a given Q_L) from Table 7. If a *LSL* is not specified or the specification is zero (0), P_L will be 100.

Determine the Quality Level(QL) (the total percent within the specification limits).

Quality Level(QL) = $(P_U + P_L) - 100$

For air voids, each lot will be assigned a pay factor using the following equation:

$$\frac{55 + (0.5)QL}{100}$$

 $Table~5\\ P_U~or~P_L~Percent~within~Limits~for~Positive~Values~of~Q_U~or~Q_L~for~a~given~Sample~Size~(n)$

PWL	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9	n = 10 to 11	n = 12 to 14	n = 15 to 18
100	1.16	1.50	1.79	2.03	2.23	2.39	2.53	2.65	2.83	3.03
99	_	1.47	1.67	1.80	1.89	1.95	2.00	2.04	2.09	2.14
98	1.15	1.44	1.60	1.70	1.76	1.81	1.84	1.86	1.91	1.93
97	_	1.41	1.54	1.62	1.67	1.70	1.72	1.74	1.77	1.79
96	1.14	1.38	1.49	1.55	1.59	1.61	1.63	1.65	1.67	1.68
95	_	1.35	1.44	1.49	1.52	1.54	1.55	1.56	1.58	1.59
94	1.13	1.32	1.39	1.43	1.46	1.47	1.48	1.49	1.50	1.51
93	_	1.29	1.35	1.38	1.40	1.41	1.42	1.43	1.44	1.44
92	1.12	1.26	1.31	1.33	1.35	1.36	1.36	1.37	1.37	1.38
91	1.11	1.23	1.27	1.29	1.30	1.30	1.31	1.31	1.32	1.32
90	1.10	1.20	1.23	1.24	1.25	1.25	1.26	1.26	1.26	1.27
89	1.09	1.17	1.19	1.20	1.20	1.21	1.21	1.21	1.21	1.22
88	1.07	1.14	1.15	1.16	1.16	1.16	1.16	1.17	1.17	1.17
87	1.06	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
86	1.04	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
85	1.03	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04
84	1.01	1.02	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00
83	1.00	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.96	0.96
82	0.97	0.96	0.95	0.94	0.93	0.93	0.93	0.92	0.92	0.92
81	0.96	0.93	0.91	0.90	0. 90	0.89	0.89	0.89	0.89	0.88
80	0.93	0.90	0.88	0.87	0.86	0.86	0.86	0.85	0.85	0.85
79	0.91	0.87	0.85	0.84	0.83	0.82	0.82	0.82	0.82	0.81
78	0.89	0.84	0.82	0.80	0.80	0.79	0.79	0.79	0.78	0.78
77	0.87	0.81	0.78	0.77	0.76	0.76	0.76	0.75	0.75	0.75
76	0.84	0.78	0.75	0.74	0.73	0.73	0.72	0.72	0.72	0.71
75	0.82	0.75	0.72	0.71	0.70	0.70	0.69	0.69	0.69	0.68
74	0.79	0.72	0.69	0.68	0.67	0.66	0.66	0.66	0.66	0.65
73	0.76	0.69	0.66	0.65	0.64	0.63	0.63	0.63	0.62	0.62
			_		_			n = 10	n = 12	n = 15
PWL	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9	to 11	to 14	to 18
72	0.74	0.66	0.63	0.62	0.61	0.60	0.60	0.60	0.59	0.59
71	0.71	0.63	0.60	0.59	0.58	0.57	0.57	0.57	0.57	0.56
70	0.68	0.60	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.53
69	0.65	0.57	0.54	0.53	0.52	0.52	0.51	0.51	0.51	0.50
68	0.62	0.54	0.51	0.50	0.49	0.49	0.48	0.48	0.48	0.48
67	0.59	0.51	0.47	0.47	0.46	0.46	0.46	0.45	0.45	0.45
66	0.56	0.48	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42
65	0.52	0.45	0.43	0.41	0.41	0.40	0.40	0.40	0.40	0.39
64	0.49	0.42	0.40	0.39	0.38	0.38	0.37	0.37	0.37	0.36

63	0.46	0.39	0.37	0.36	0.35	0.35	0.35	0.34	0.34	0.34
62	0.43	0.36	0.34	0.33	0.32	0.32	0.32	0.32	0.31	0.31
61	0.39	0.33	0.31	0.30	0.30	0.29	0.29	0.29	0.29	0.29
60	0.36	0.30	0.28	0.27	0.27	0.27	0.26	0.26	0.26	0.26
59	0.32	0.27	0.25	0.25	0.24	0.24	0.24	0.24	0.23	0.23
58	0.29	0.24	0.23	0.22	0.21	0.21	0.21	0.21	0.21	0.21
57	0.25	0.21	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.18
56	0.22	0.18	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.15
55	0.18	0.15	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13
54	0.14	0.12	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10
53	0.11	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
52	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05
51	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NOTE: For negative values of Q_U or Q_L , P_U or P_L is equal to 100 minus the table value for P_U or P_L . If the value of Q_U or Q_L does not correspond exactly to a figure in the table, use the next higher figure.

B. Pay Factors for Gradation (SP-1 & SP-2 only), VMA (SP-3 thu SP-6 only) and Density (all mix classes)

Table 6 Pay Factor for a given Sample Size (n) and Quality Level

_								n = 10	n = 12	n = 15
Pay	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9	to	to	to
Factor								n=11	n=14	n=18
1.05	100	100	100	100	100	100	100	100	100	100
1.04	90	91	92	93	93	93	94	94	95	95
1.03	80	85	87	88	89	90	91	91	92	93
1.02	75	80	83	85	86	87	88	88	89	90
1.01	71	77	80	82	84	85	85	86	87	88
1.00	68	74	78	80	81	82	83	84	85	86
0.99	66	72	75	77	79	80	81	82	83	85
0.98	64	70	73	75	77	78	79 - 2	80	81	83
0.97	62	68	71	74	75	77	78	78	80	81
0.96	60	66	69	72	73	75	76	77	78	80
0.95	59	64	68	70	72	73	74	75	77	78
0.94	57	63	66	68	70	72	73	74	75	77
0.93	56	61	65	67	69	70	71	72	74	75
0.92	55	60	63	65	67	69	70	71	72	74
0.91	53	58	62	64	66	67	68	69	71	73
0.90	52	57	60	63	64	66	67	68	70	71
0.89	51	55	59	61	63	64	66	67	68	70
0.88	50	54	57	60	62	63	64	65	67	69
0.87	48	53	56	58	60	62	63	64	66	67
0.86	47	51	55	57	59	60	62	63	64	66
0.85	46	50	53	56	58	59	60	61	63	65
0.84	45	49	52	55	56	58	59	60	62	64
0.83	44	48	51	53	55	57	58	59	61	63
0.82	42	46	50	52	54	55	57	58	60	61
0.81	41	45	48	51	53	54	56	57	58	60
0.80	40	44	47	50	52	53	54	55	57	59
0.79	38	43	46	48	50	52	53	54	56	58
0.78	37	41	45	47	49	51	52	53	55	57
0.77	36	40	43	46	48	50	51	52	54	56
0.76	34	39	42	45	47	48	50	51	53	55
0.75	33	38	41	44	46	47	49	50	51	53

- C. Calculation of Incentive/Disincentive Payment for SP-1 & SP-2 mixes
 - Pay factors for test strips, leveling courses, approaches and miscellaneous paving not placed with mainline paving shall be 1.00. The Maximum Pay Factor will be 1.05. If any individual Composite Pay Factor Value falls below 0.85 the maximum Pay Factor Value, the lowest CPF Value. Material with a Pay Factor less than 0.75 shall be rejected and removed at no cost to the District.
 - 2. A Composite Pay Factor for Plant Mix Aggregate (CPF_(PMA)) will be computed as:
 - a. $(PF_{AV})(0.3) = CPF_{(PMA)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 3. A Composite Pay Factor for Asphalt Binder Content (CPF_(ABC)) will be computed as:
 - a. $(PF_{AV})(0.3) = CPF_{(ABC)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 4. A Composite Pay Factor for Density (CPF_(Dens.)) will be computed as follows:
 - a. $(PF_{AV})(0.4) = CPF_{(Dens.)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 5. Calculation of Incentive/Disincentive Payment. The incentive/disincentive payment for all Superpave plant mix pavement accepted by the Owner, excluding plant mix pavement for approaches and miscellaneous paving not placed with mainline paving, will be computed using the formula:
 - a. $B = (A) ((CPF_{(PMA)} + CPF_{(ABC)} + CPF_{(Dens.)}) -1) (Q)$
 - b. B = Total Incentive/disincentive payment for all Plant Mix Pavement accepted
 - c. A = Unit Bid Price
 - d. Q = Total Quantity of Plant Mix Pavement accepted
- D. Calculation of Incentive/Disincentive Payment for SP-3 thru SP-6 mixes
 - Pay factors for test strips, leveling courses, approaches and miscellaneous paving not placed with mainline paving shall be 1.00. The Maximum Pay Factor will be 1.05. If any individual Composite Pay Factor Value falls below 0.85 the maximum Pay Factor Value, the lowest CPF Value. Material with a Pay Factor less than 0.75 shall be rejected and removed at no cost to the District.
 - 2. A Composite Pay Factor for Air Void (CPF(AIR VOID)) will be computed as:
 - a. $(PF_{AV})(0.3) = CPF_{(AIR\ VOID)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 3. A Composite Pay Factor for VMA (CPF_(VMA)) will be computed as:
 - a. $(PF_{AV})(0.3) = CPF_{(VMA)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 4. A Composite Pay Factor for Density (CPF_(Dens.)) will be computed as follows:
 - a. $(PF_{AV})(0.4) = CPF_{(Dens.)}$
 - b. PF_{AV} = Weighted average based on quantity of material in each lot.
 - 5. Calculation of incentive/disincentive payment. The incentive/disincentive payment for all Superpave Hot Mix Asphalt accepted by the Owner, excluding plant mix pavement for approaches and miscellaneous paving not placed with mainline paving, will be computed using the formula:
 - a. $B = (A) ((CPF_{(AIR\ VOID)} + CPF_{(VMA)} + CPF_{(Dens.)}) -1) (Q)$
 - b. B =Total incentive/disincentive payment for all Plant Mix Pavement accepted

- c. A = Unit Bid Price
- i. Q = Total Quantity of Plant Mix Pavement accepted

PART 5 DISPUTE RESOLUTION SIGNIFICANT DIFFERENCE

- 5.1 Table 7 quantifies the significant difference for differing quality assurance measures.
 - A. For Superpave Plant Mix dispute density testing, cores obtained from the same location as the nuclear or non-nuclear gauge test shall be used.

Table 7

Characteristic	Significant Difference
Air Voids	0.5 percent
VMA	0.5 percent
Asphalt Content	0.2 percent
Percent Compaction	1 percent
#4 or Larger Sieves	4 percent
#8 to #30 Sieves	3 percent
#50 to #100 Sieves	2 percent
#200 Sieve	1.0 percent
Sand Equivalent	4

5.2 QUALITY ASSURANCE

- 1. Quality Assurance/verification of the Contractors testing will be performed by the County. Quality Assurance test results will not be substituted for acceptance results.
- B. Quality Assurance results will be used to evaluate the Contractor's Quality Control/acceptance test results. The data will be evaluated on a cumulative basis and not on a lot by lot basis as follows:
 - 1) If the evaluation indicates the test results are consistent (t-test passes), then the Engineer will combine the Contractor's tests into lots for Quality Analysis. The lots will be used by the Engineer to represent the material produced in Quality Analysis. Tests can only be excluded with approval of the Engineer. Lot size will be determined by the Engineer. The following criteria will be used:
 - i. A lot is based on work shift's production.
 - ii. Minimum Lot size is 3 tests.
 - iii. If the work shift is represented by less than three tests, the test (s) will be combined with the following work shift.
 - iv. If the final work shift is represented by less than three tests, the test (s) will be combined with the previous work shift.
 - 2) If the evaluation indicates the test results are inconsistent (t-test fails), production shall be stopped. The Engineer will review contractor test procedures, calculations, and documentation to determine the source of the differences. Production will not be allowed to resume until the source of the differences is determined and corrected. If the source of the differences is determined to be caused by the Contractor, the State will not grant additional contract time.

PART 6 HOT MIX DEPTH

- 6.1 Depth will be based on the average from the cores obtained for the density gauge correlations, as outlined in the Minimum Testing Frequency Table for QC/QA.
- A. For newly constructed roadways, roadways that have had the existing plant mix milled the full width, existing plant mix has been removed, or one or more leveling courses are required. If more than one lift of plant mix is placed, the depth will be based on the both lifts combined. The following table 8 shall apply.

Table 8

Actual Pavement Depth Vs. Planned	Payment Adjustment
	No Payment for overage, and remedy action required if
Over .55"	under .55"
.45" to.55"	65% Deduct
.35" to.45"	45% Deduct
.25" to .35"	25% Deduct
.00" to .25"	0% Deduct

B. Example: 3" of hot plant mix is required per plan. Cores averaged 3.6". 700 tons of plant mix was placed. Bid per ton was \$60.

Deduct: 3.00" to 3.25" = Zero

3.25" to 3.35" = $700 \text{ton x} (1-(3.25/3.35)) \times $60 \times .25\% = 313.43 deduct

3.35" to 3.45" = $700 \text{ton x} (1-(3.35/3.45)) \times $60 \times .45\% = 547.83 deduct

3.45" to 3.55" = $700 \text{ton x} (1-(3.45/3.55)) \times $60 \times .65\% = 769.01 deduct

3.55" to 3.60" = 700ton x (1-(3.55/3.60)) x \$60 x 1.0 % = \$588.33 deduct

Total Deduct = \$313.43 + \$547.83 + \$769.01 + \$588.33 = \$2,218.60 deduct

• The following Standard Drawings shall be deleted from Division 800 of the ISPWC:

SD-801 SD-805 SD-809

SD-802 SD-806

• The following 2012 ACHD Standard Drawing Revision shall be added to Division 800 of the ISPWC:

SD-801 SD-805 SD-809 SD-802 SD-806

Division 900 -

No Changes

Division 1100-

- Section 1101 Traffic Signals & Appurtenances will be deleted in its entirety
- Section 1104 Permanent Pavement Markings will be deleted in its entirety
- Section 1105 Permanent Traffic Signing will be deleted in its entirety

- ACHD Traffic Department Section 1130 General Conditions shall be added in its entirety
- ACHD Traffic Department Section 1131 Illumination, Traffic Signal Systems and Electrical *shall be added in its entirety*
- ACHD Traffic Department Section 1134 Pavement Markings and Delineation shall be added in its entirety
- ACHD Traffic Department Section 1135 Roadside Traffic Signs shall be added in its entirety
- ACHD Traffic Department Section 1150 Intelligent Transportation Systems (ITS) shall be added in its entirety
- Section 1103- Construction Traffic Control, Part 2.1 General, The following shall be added:
 - F. Steel plates placed in public streets to cover holes or to protect manhole collars during curing shall be beveled for one-half the thickness of the plate and beveled at a 45 degree angle. The plates shall be of sufficient size to adequately cover the hole and each plate shall be anchored in placed with asphalt to prevent the plates from moving.
- ACHD Traffic Department Section 1134.03 Pavement Markings and Traffic Stripes Paint, Sub Section
 C, Paragraph 2. The following shall be <u>added</u>: The first coat of paint must be applied within 3-7 days of
 paving. The second coat must be applied within 3-7 days from the first coat being applied.
- The following ACHD Traffic Department Standard Drawings shall be added:
- a. TS-INDEX Updated to reflect revision dates for traffic standards (12/11).
- b. TS-SYMB Updated to eliminate symbols that are no longer used and added symbols for new traffic control devices (11/11).
- c. TS-1100 Drawing eliminated; loops are no longer installed at new or rebuilt intersections for vehicle detection (11/11).
- d. TS-1101 Drawing eliminated; loops are no longer installed at new or rebuilt intersections for vehicle detection (11/11).
- e. TS-1102 Drawing changed to include detection zones for video detection cameras; added detail for video detection camera mounting (12/11).
- f. TS-1103 Added wiring detail for pedestrian hybrid beacons and flashing yellow arrows (11/11).
- g. TS-1104 Drawing eliminated; loops are no longer installed for vehicle detection (11/11).
- h. TS-1105 Modified detail for 32"x32" junction box, per traffic operations input (11/11).
- i. TS-1106 Added detail for pedestrian hybrid beacon signal head; modified detail for the hazard identification beacon (11/11).
- j. TS-1108 Modified detail for pedestrian push button placement to reflect changes to ADA/PROWAG guidelines (12/11).
- k. TS-1109 Clarified font type for street name signs (12/11).
- I. TS-1110 Modified foundation and mounting height to reflect changes to pedestrian push button poles; added chart to clarify sizes of signal pole bases (11/11).
- m. TS-1111 Added foundation detail for ITS cabinet (12/11).
- n. TS-1112 Added roundabout entry marking detail (3/11).
- o. TS-1113 Added standard "shared road marking" detail (12/11).
- p. TS-1115 Added modified "Crosswalk, Stop on Red" sign for pedestrian hybrid beacon installations (5/11).
- q. TS-1117 Removed signal head placement for five section "dog house" signals (12/11).

- r. TS-1120 Added sign to typical posting for permitted u-turn applications at signalized intersections (12/11).
- s. TS-1121 Added detail for speed hump installation (7/2011).
- The following Standard Drawings shall be deleted from Division 1100 of the ISPWC:

SD-1132

• The following **2012 ACHD Standard Drawing Revision** shall be <u>added</u> to *Division 1100* of the ISPWC:

SD-1132A SD-1132B

Division 2000-

• Section 2020- Survey Monuments, Part 3.1 Reference Points, Paragraph A, Page 2, the following shall be added:

Monuments include but not limited to 1/2", 5/8" iron pins (with or without survey caps), brass and aluminum caps and iron pipes.

Section and Section 1/4 corners lost shall be replaced with a minimum 3" diameter brass cap or aluminum cap monument. Those corners found to lie greater than 0.5' below the road surface shall be brought flush with the finish surface upon completion of the road work.

• Section 2020- Survey Monuments, Part 3.4 Standard Rebar Monument, Paragraph A, Page 3, the following shall be added:

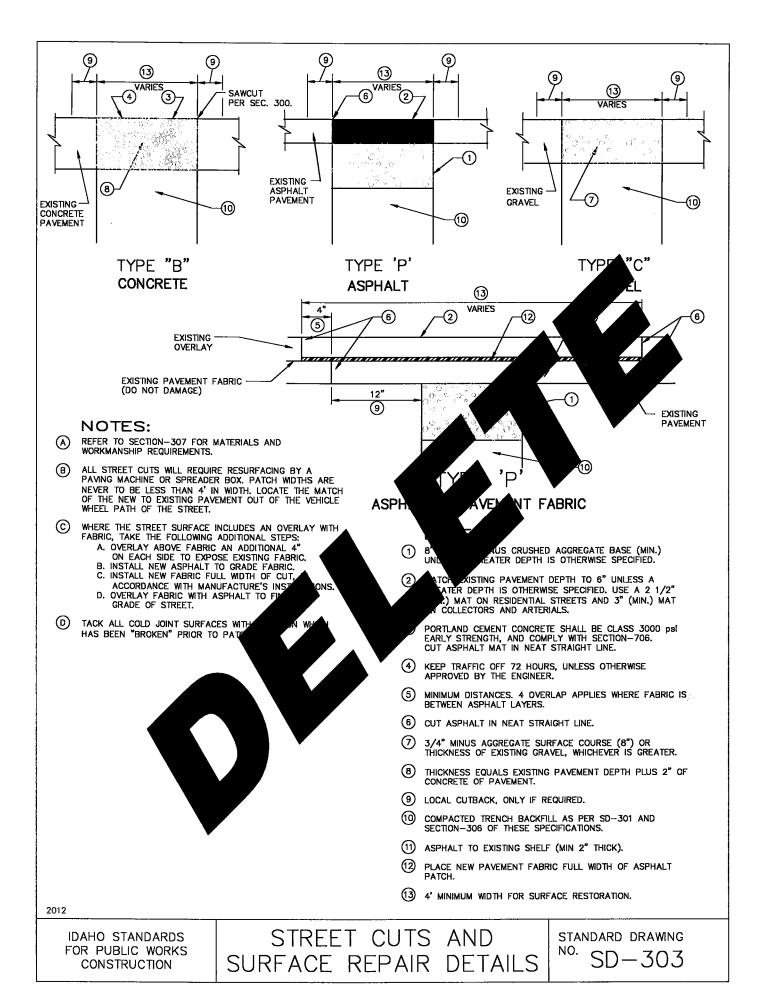
Lost monuments shall be remonumented under the direction of a PLS and shall conform to the following Idaho Statutes; Title 54-1227, Title 55-1604 and Title 55-1613. A Corner Record (CP&F) and if necessary a Record of Survey shall be prepared for corners replaced and then filed in the Office of the County Recorder.

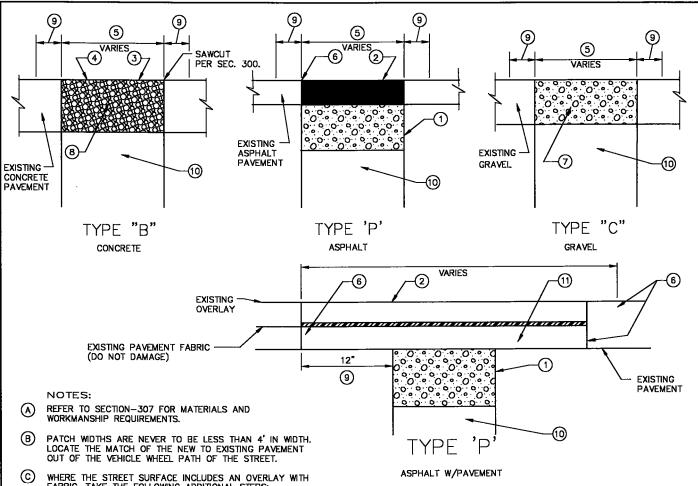
• Section 2030 – Utility Adjustments, Part 3.1 Manholes, Storm Drains, and Valve Boxes, Paragraph A, Page 2, the following shall be added:

If necessary, this may include supplying a new cone section.

C. The following **2012 ACHD Standard Drawing Revision** shall be <u>added</u> to *Division 2000* of the ISPWC:

SD-2040J





- WHERE THE STREET SURFACE INCLUDES AN OVERLAY WITH FABRIC, TAKE THE FOLLOWING ADDITIONAL STEPS:
 - A. OVERLAY ABOVE FABRIC AN ADDITIONAL 4"
 ON EACH SIDE TO EXPOSE EXISTING FABRIC.
 B. INSTALL NEW ASPHALT TO GRADE FABRIC.
 C. WITH ASPHALT TO FINISH
 GRADE OF STREET.
- TACK ALL COLD JOINT SURFACES WITH EMULSION WHICH HAS BEEN "BROKEN" PRIOR TO PATCHING.

LEGEND

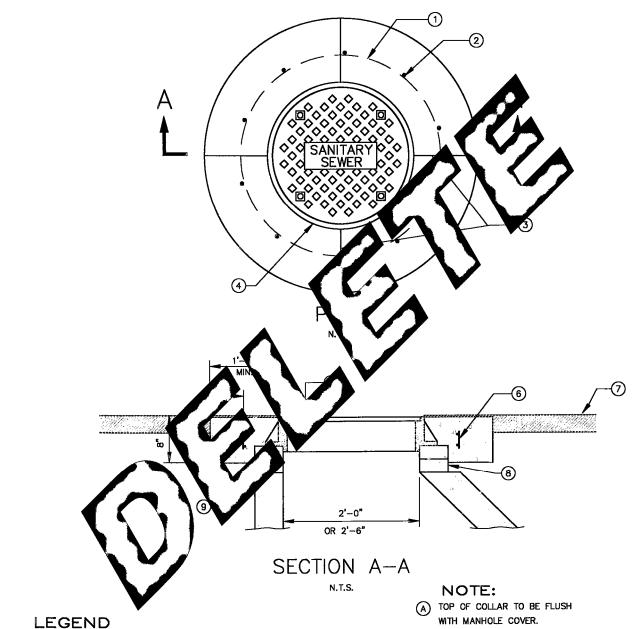
- 8" OF 3/4" MINUS CRUSHED AGGREGATE BASE (MIN.) UNLESS A GREATER DEPTH IS OTHERWISE SPECIFIED.
- (2) MATCH EXISTING PAVEMENT DEPTH TO 6" UNLESS A GREATER DEPTH IS OTHERWISE SPECIFIED. USE A 2 1/2" (MIN.) MAT ON RESIDENTIAL STREETS AND 3" (MIN.) MAT ON COLLECTORS AND ARTERIALS.
- 3 PORTLAND CEMENT CONCRETE SHALL BE CLASS 4000 psi AND COMPLY WITH SECTION-706. CUT ASPHALT MAT IN NEAT STRAIGHT LINE.
- KEEP TRAFFIC OFF 72 HOURS, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- (5) 4' MINIMUM WIDTH FOR SURFACE RESTORATION.
- (6) CUT ASPHALT IN NEAT STRAIGHT LINE.
- 3/4" MINUS AGGREGATE SURFACE COURSE (8") OR THICKNESS OF EXISTING GRAVEL, WHICHEVER IS GREATER.
- THICKNESS EQUALS EXISTING PAVEMENT DEPTH PLUS 2" OF CONCRETE OF PAVEMENT. (8)
- (9) LOCAL CUTBACK, ONLY IF REQUIRED.
- COMPACTED TRENCH BACKFILL AS PER SD-301 AND SECTION-306 OF THESE SPECIFICATIONS.
- (11) ASPHALT TO EXISTING SHELF (MIN 2" THICK).

2012 ACHD REVISION

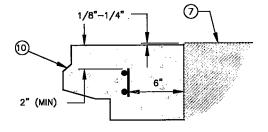
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

STREET CUTS AND SURFACE REPAIR DETAILS

STANDARD DRAWING NO. SD - 303



- 1) #4 REBAR HOOPS (2 EACH) SEE SECTION A-A).
- 2) #4 REBAR AT 20" SPACING.
- 3 SCORES.
- 4 RIM.
- (5) FRAME AND COVER PER SD-507 AND SD-507A.
- (6) SEE "DETAIL A" FOR REBAR IN COLLAR.
- 7 FINISHED GRADE.
- (8) SEE OTHER STANDARD DRAWINGS OF MANHOLES FOR MAXIMUM HEIGHT.
- 9 GROUT BETWEEN RING AND COVER AND GRADE RINGS.
- FRIBILLATED POLYPROPYLENE FIBER (ADDED PER MANUFACTURER'S RECOMMENDATIONS) MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE COLLARS.



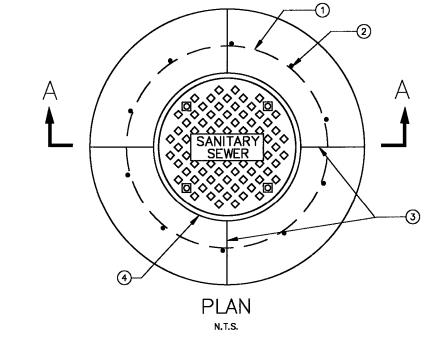
DETAIL A N.T.S.

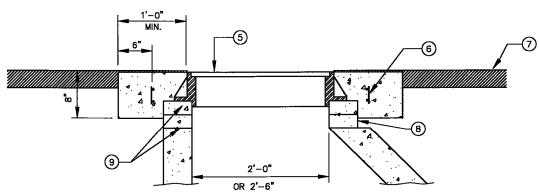
2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE COLLAR

STANDARD DRAWING SD-508





SECTION A-A

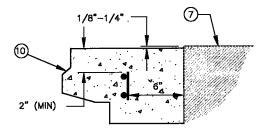
N.T.S.

NOTE:

(A) TOP OF COLLAR TO BE FLUSH WITH MANHOLE COVER.

LEGEND

- 1) #4 REBAR HOOPS (2 EACH) SEE SECTION A-A).
- 2 #4 REBAR AT 20" SPACING.
- 3 SCORES.
- 4 RIM.
- (5) FRAME AND COVER PER SD-507 AND SD-507A.
- 6 SEE "DETAIL A" FOR REBAR IN COLLAR.
- 7 FINISHED GRADE.
- (8) SEE OTHER STANDARD DRAWINGS OF MANHOLES FOR MAXIMUM HEIGHT.
- (9) GROUT BETWEEN RING AND COVER AND GRADE RINGS.
- (1) FRIBILLATED POLYPROPYLENE FIBER (1 1/2 LBS./CY)
 MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE
 COLLARS.



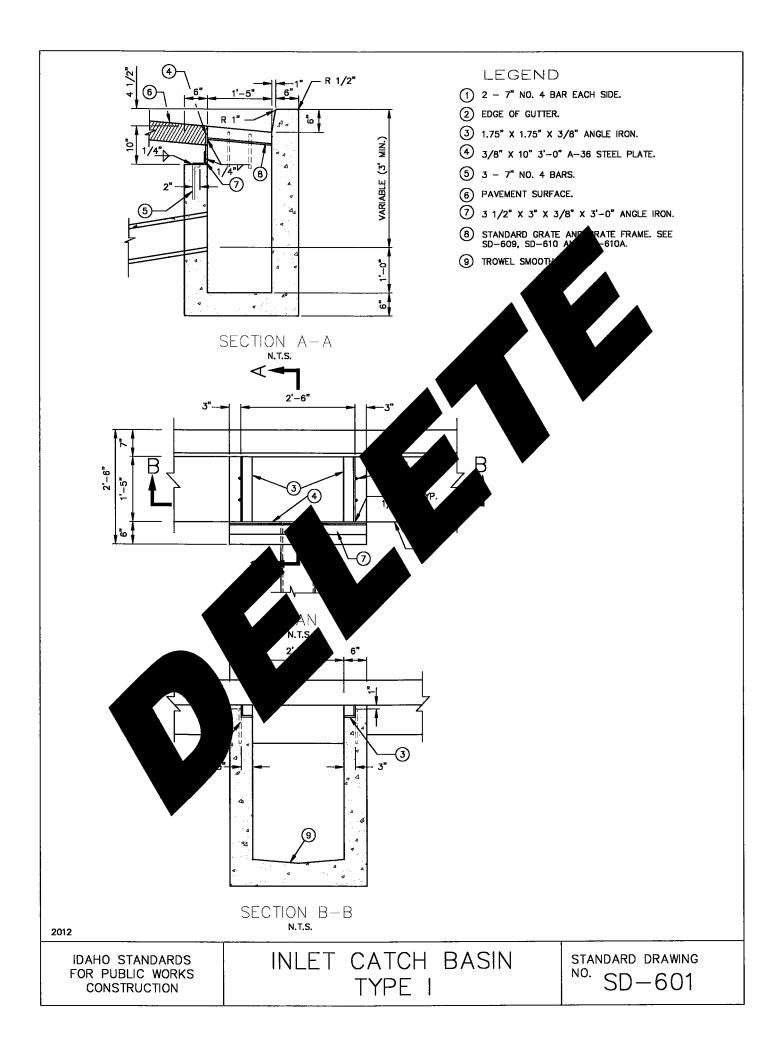
DETAIL A

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

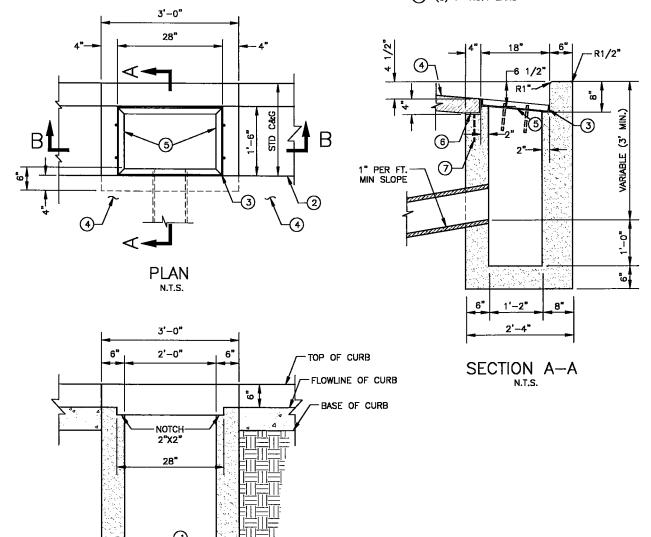
MANHOLE COLLAR

STANDARD DRAWING NO. SD-508



LEGEND

- 1 TROWEL SMOOTH
- 2 EDGE OF GUTTER
- 3 1.75" X 1.75" X 1/4" ANGLE IRON. STANDARD GRATE FRAME SEE SD-609 AND SD-610A
- 4 PAVEMENT SURFACE.
- 5 STANDARD GRATE AND GRATE FRAME. SEE SD-609 OR SD-610A.
- 6 4" X 4" X 3/8" ANGLE IRON
- (3) 7" NO.4 BARS

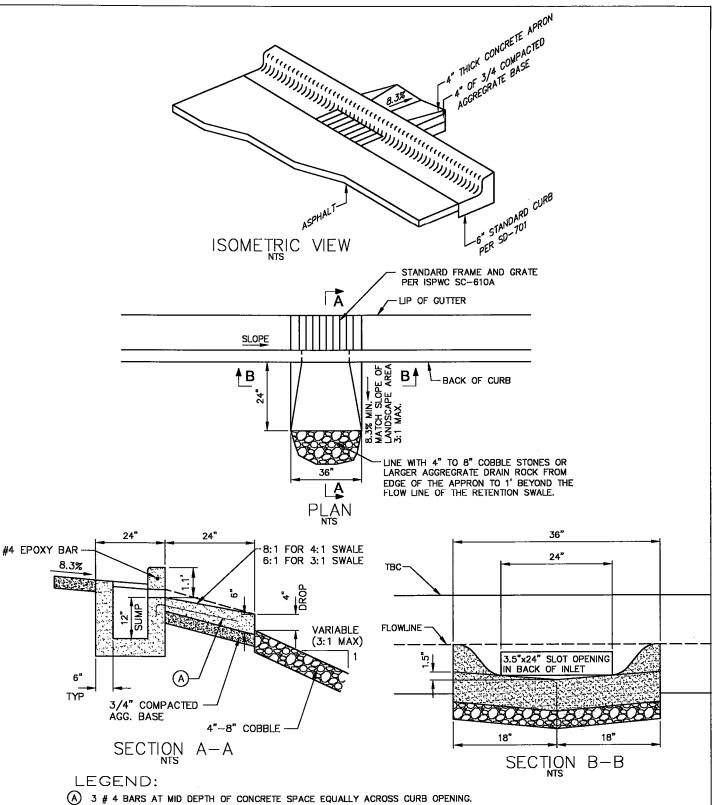


ACHD REVISION 2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

SECTION B-B

INLET CATCH BASIN TYPE I STANDARD DRAWING NO. SD-601



NOTES:

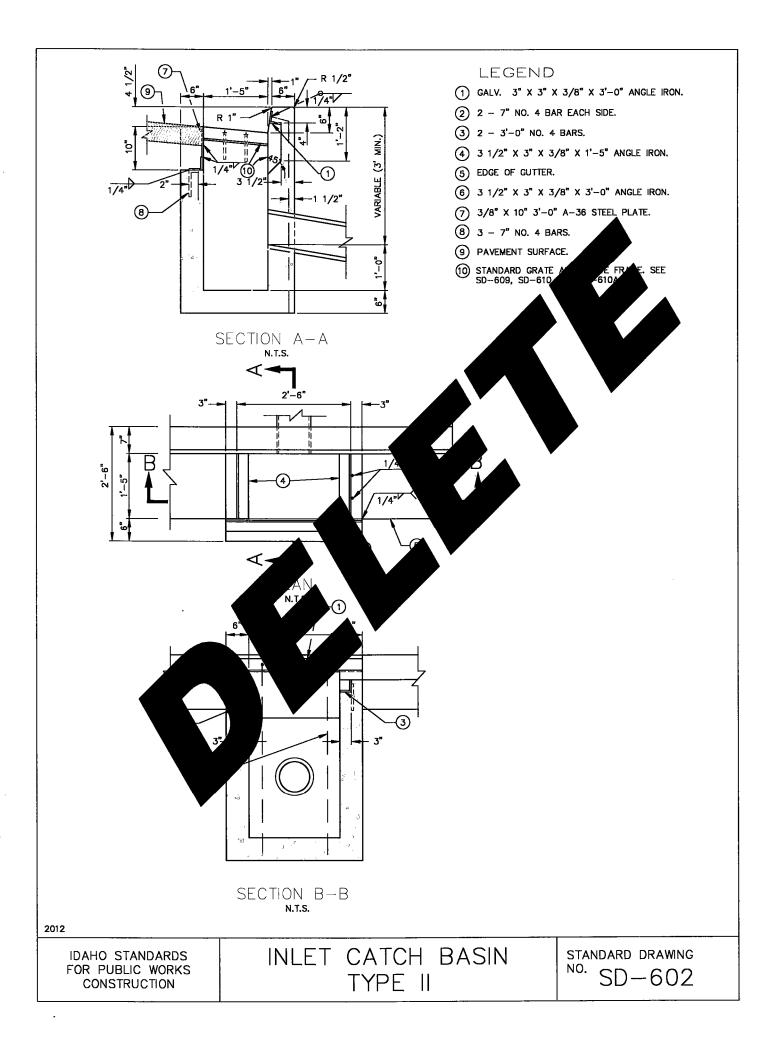
- 1. REQUIRED WITH INFLATRATION SWALE DESIGN.
- CONCRETE APRON SHALL TO REMAIN FREE OF ALL OBSTRUCTIONS INCLUDING GRASS AND OTHER VEGETATION THAT MAY BE USED IN CONJUNCTION WITH LANDSCAPING OF SWALE OR RETENTION.

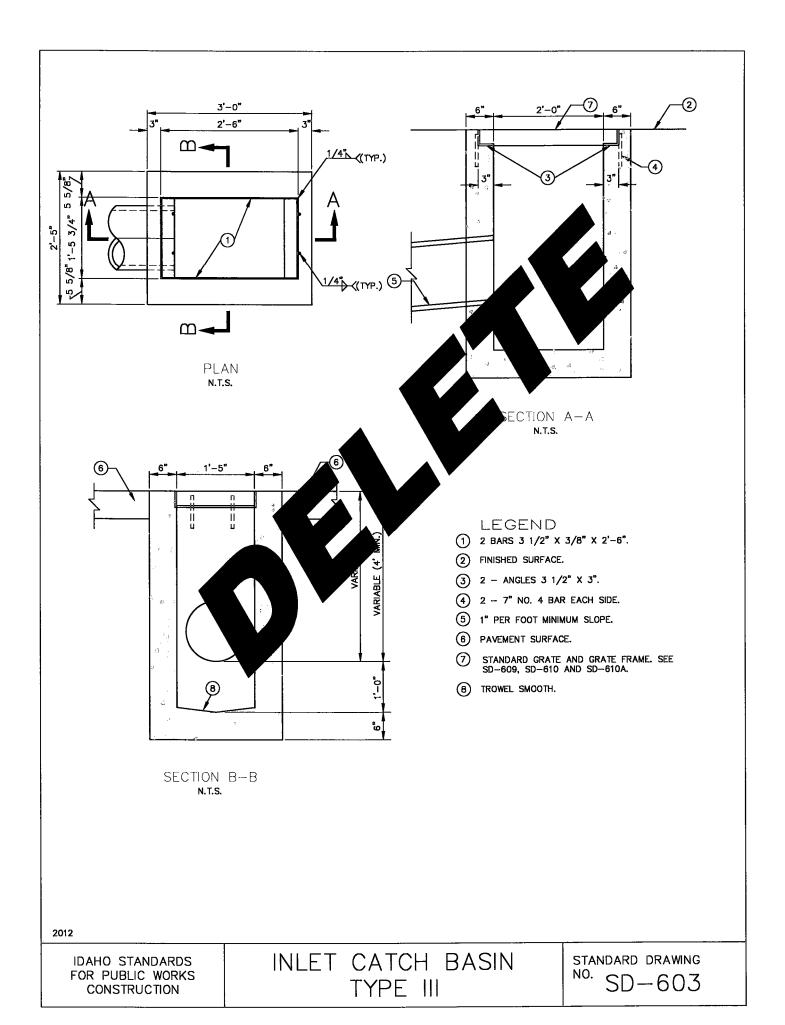
ACHD REVISION 2012

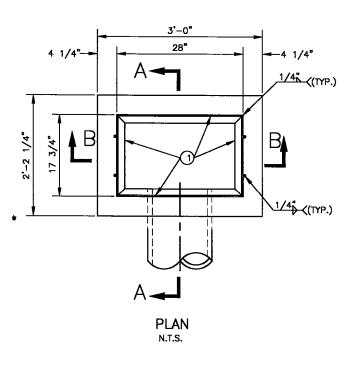
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

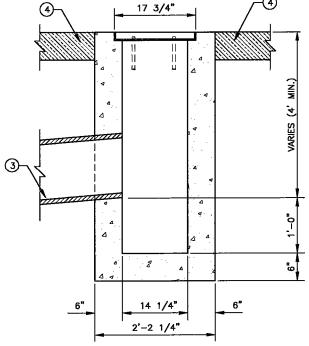
SHALLOW INLET

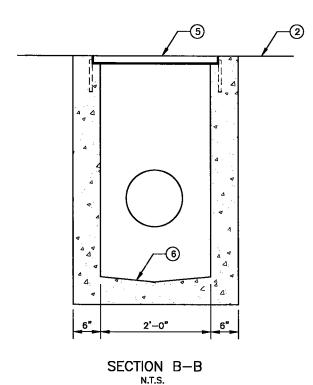
STANDARD DRAWING SD-601A











SECTION A--A

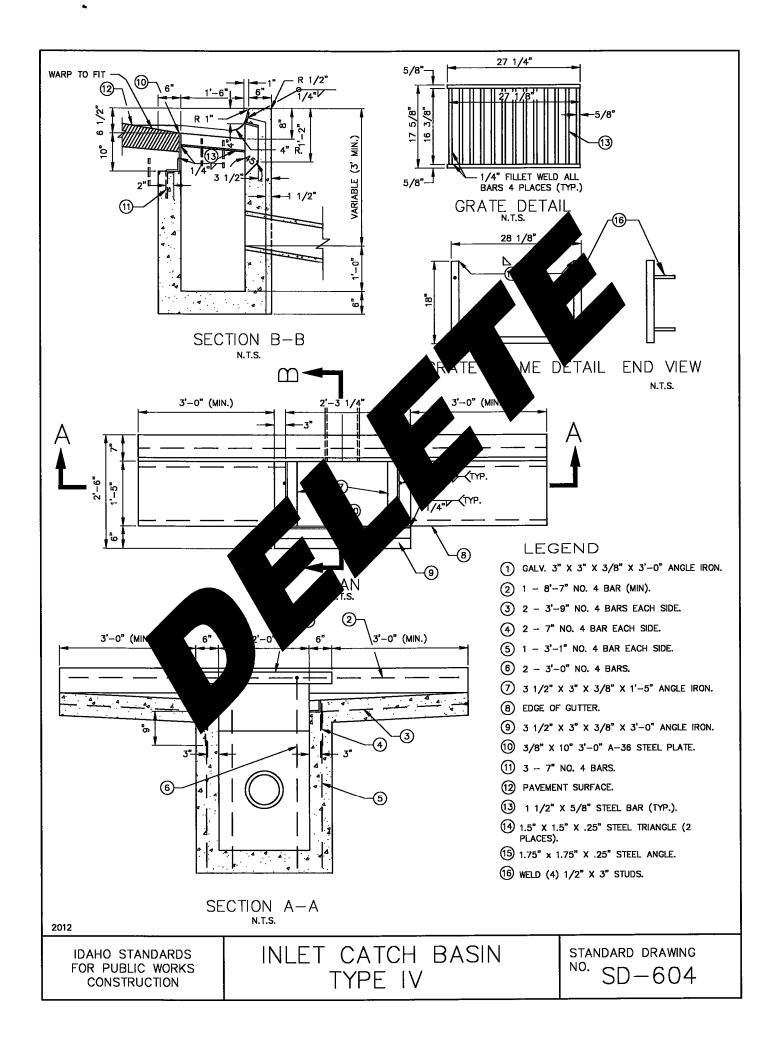
LEGEND

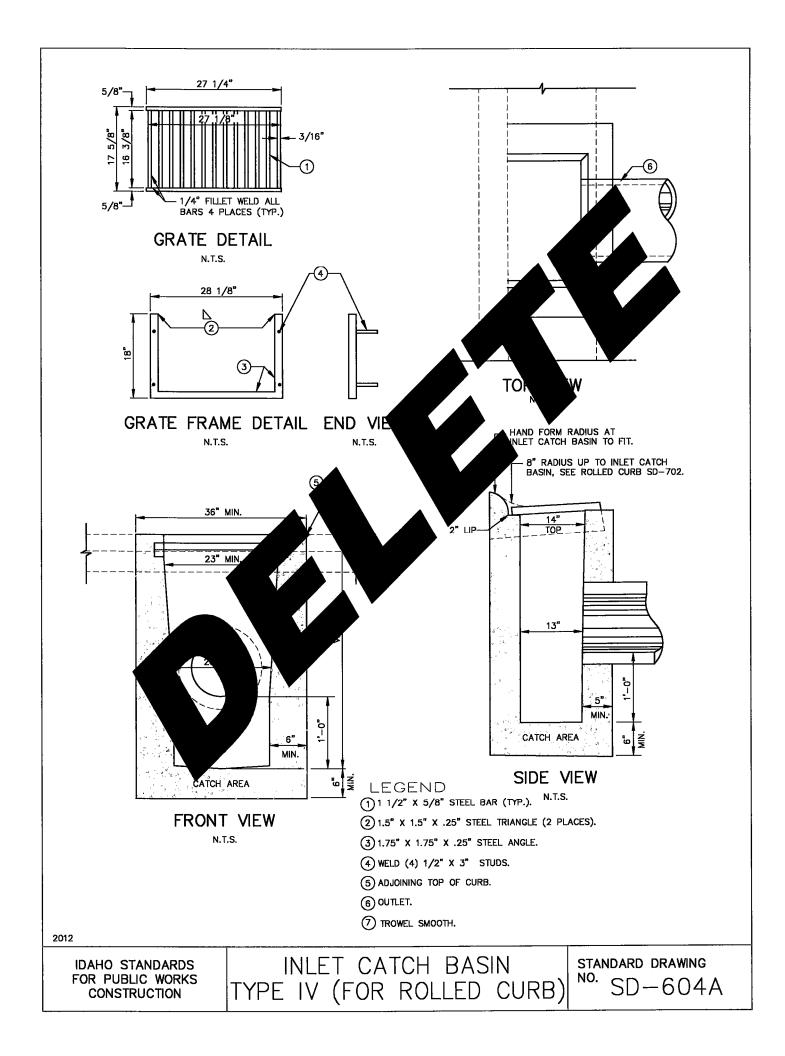
- 1.75" X 1.75" X 1/4" ANGLE IRON
- (2) FINISHED SURFACE.
- 3 1" PER FOOT MINIMUM SLOPE.
- (4) PAVEMENT SURFACE.
- 5 STANDARD GRATE AND GRATE FRAME, SEE SD-609 OR SD-610A.
- (6) TROWEL SMOOTH.

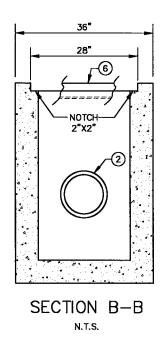
ACHD REVISION 2012

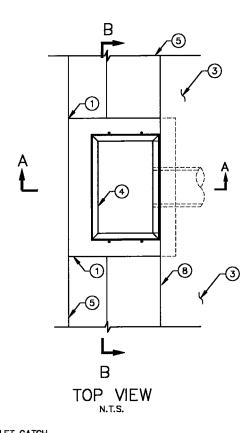
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) INLET CATCH BASIN TYPE III

standard drawing NO. SD-603









8" RADIUS UP TO INLET CATCH BASIN, SEE ROLLED CURB SD-702.

HAND FORM RADIUS AT INLET CATCH BASIN TO FIT

5 1/2"

2" LIP

2" LIP

4" TO THE PER FT. MIN SLOPE

CATCH AREA

2'-4"

SECTION A-A

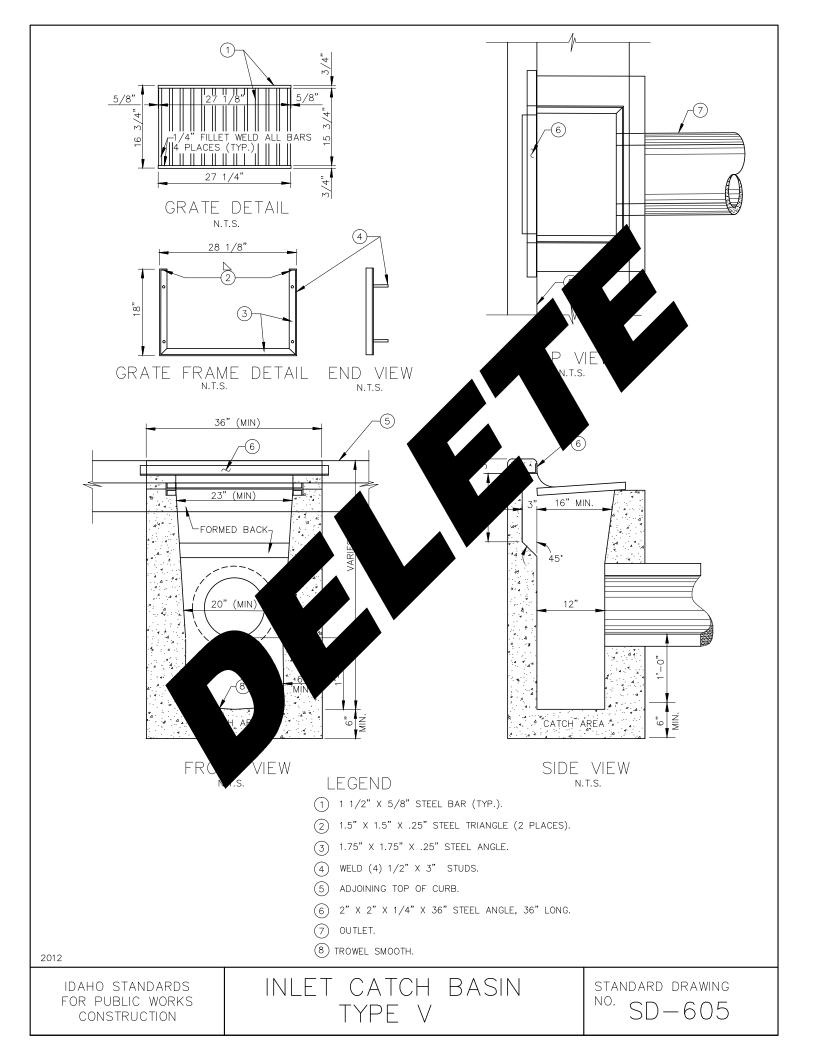
LEGEND

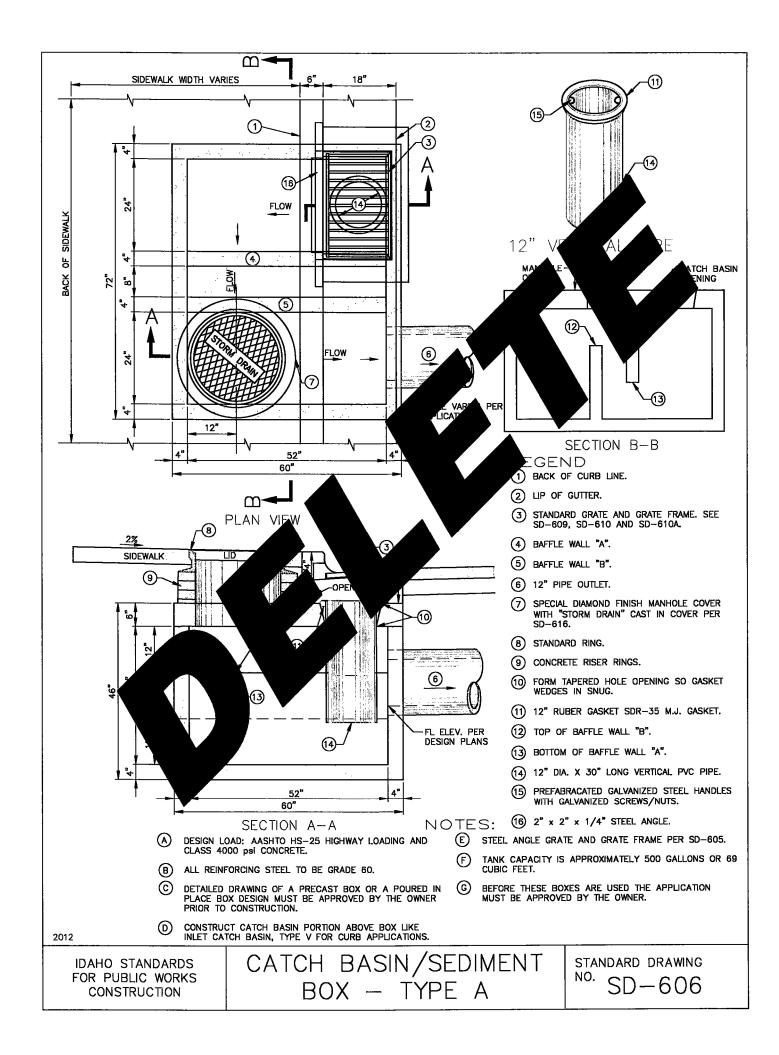
- 1 ADJOINING TOP OF CURB.
- 2 OUTLET.
- 3 PAVEMENT SURFACE.
- (4) STANDARD GRATE AND GRATE FRAME, SEE SD-609 OR SD-610A.
- (5) STANDARD ROLLED CURB AND GUTTER.
- (6) 4" X 4" X 3/8" ANGLE IRON
- (7) (3) 7° NO.4 BARS
- (8) EDGE OF GUTTER

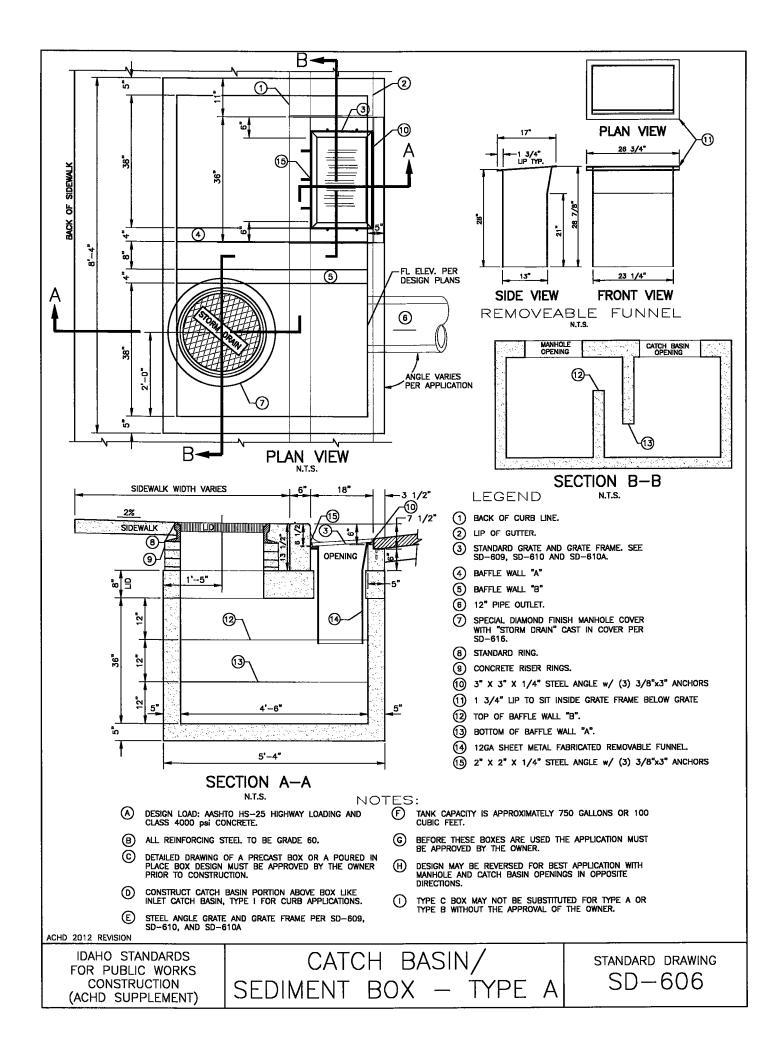
ACHD REVISION 2012

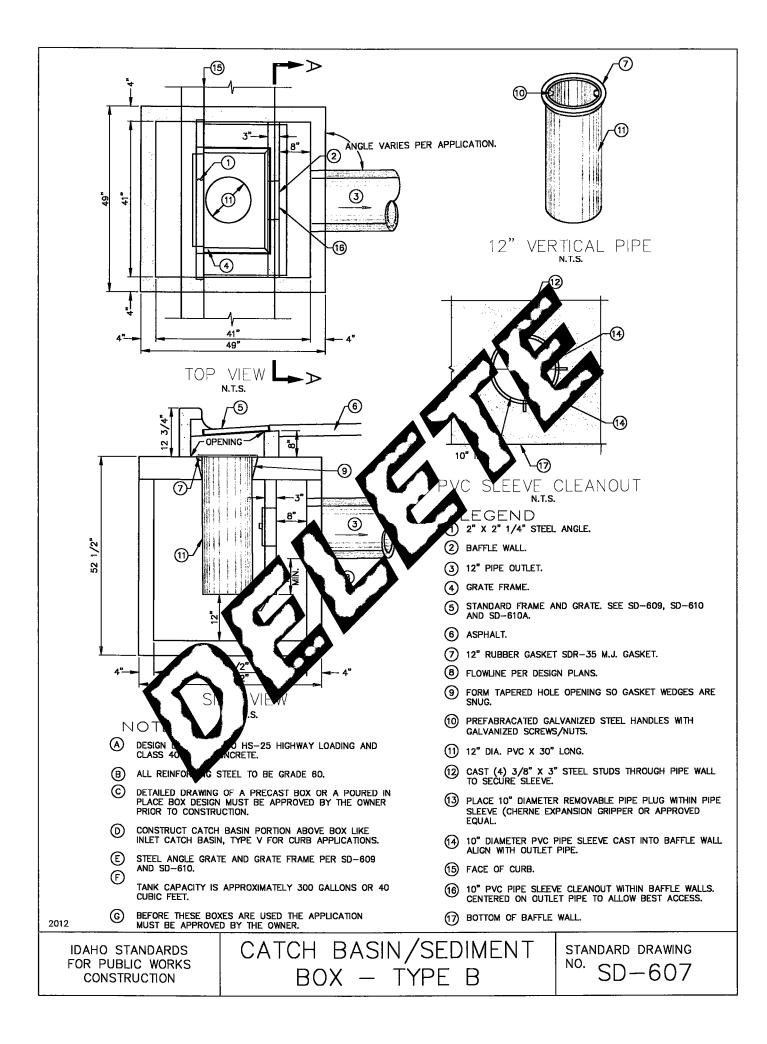
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) INLET CATCH BASIN
TYPE IV (FOR ROLLED CURB)

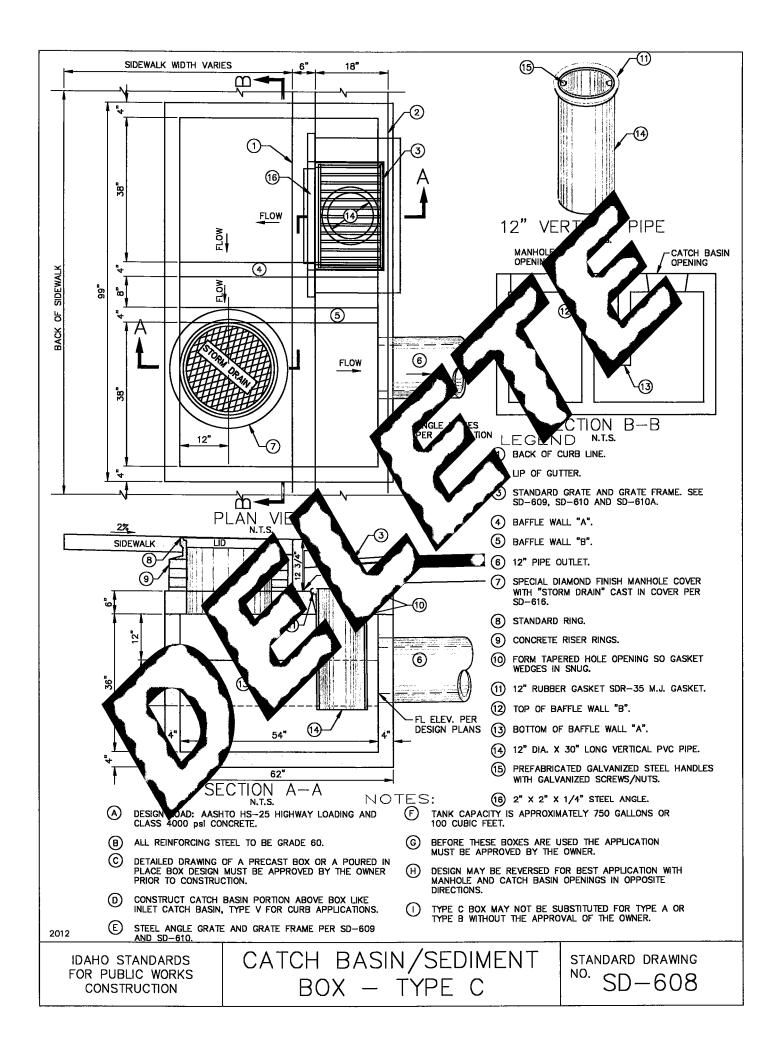
STANDARD DRAWING NO. SD-604A

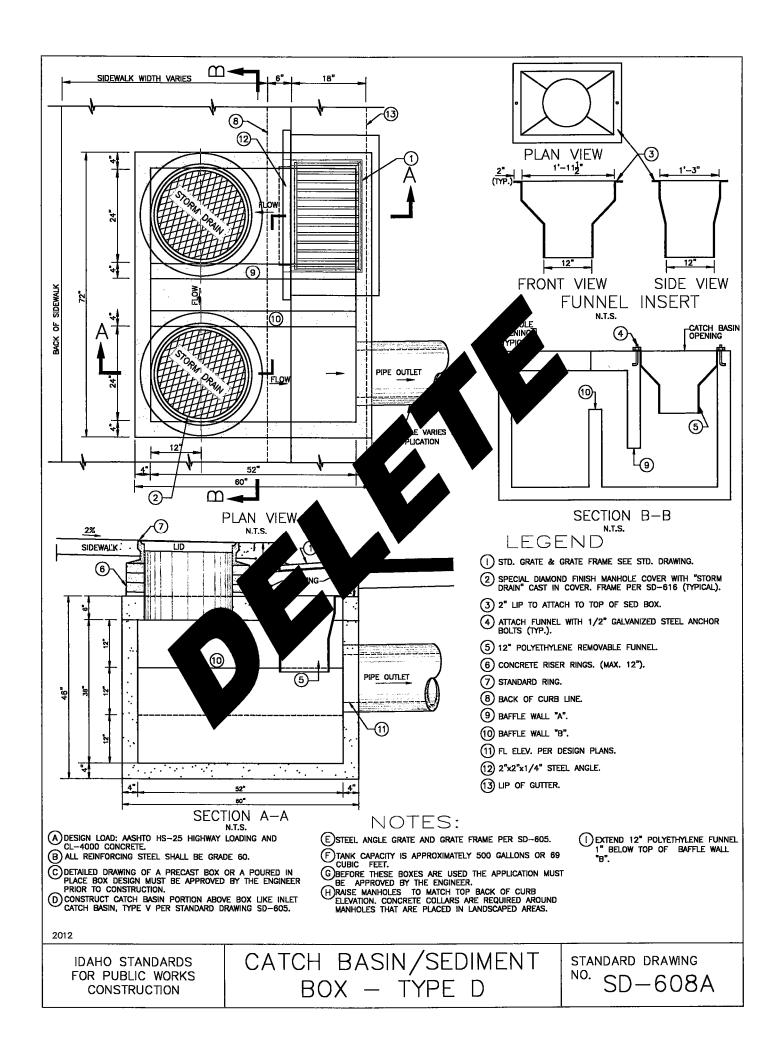


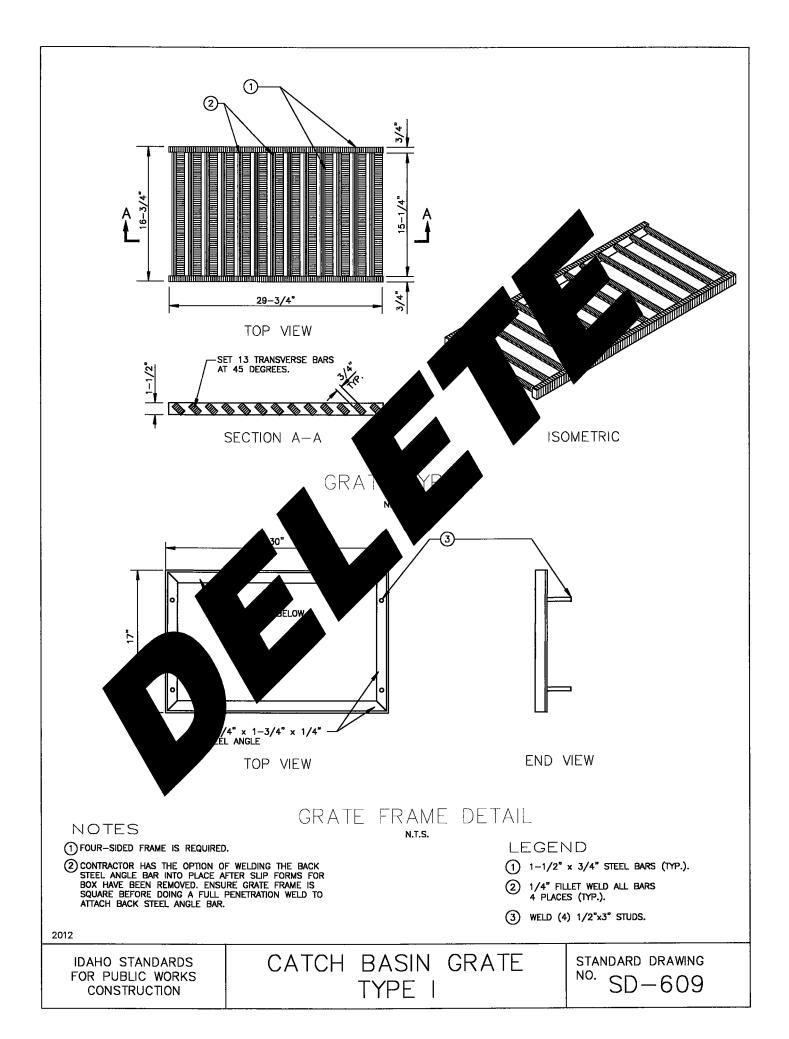


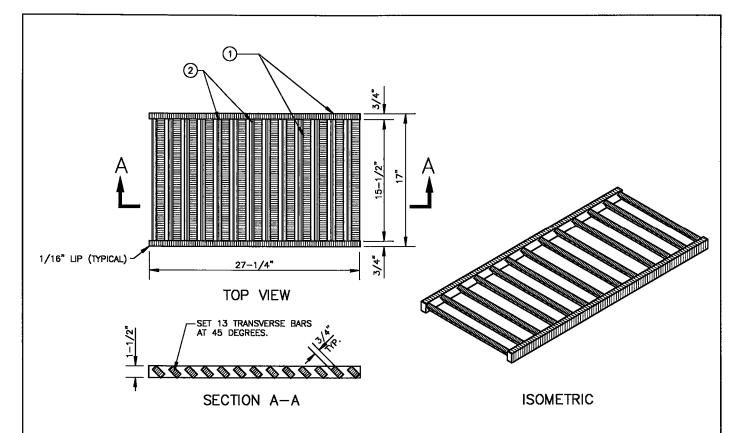






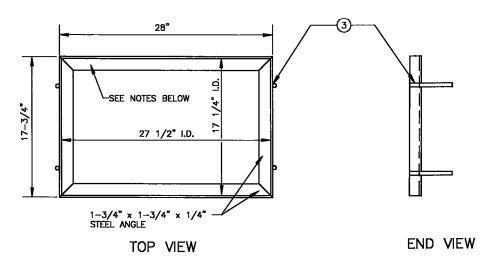






GRATE TYPE I

N.T.S.



GRATE FRAME DETAIL

NOTES

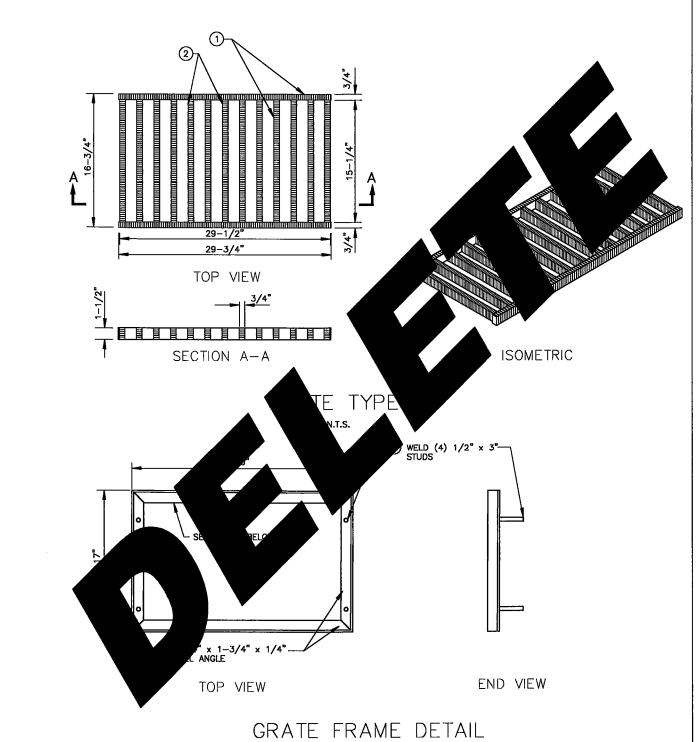
1) FOUR-SIDED FRAME IS REQUIRED.

LEGEND

- 1) 1-1/2" x 3/4" STEEL BARS (TYP.).
- 2 1/4" FILLET WELD ALL BARS. 4 PLACES (TYP.)
- (3) WELD (4) 1/2"x7" STUDS.

ACHD REVISION 2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CATCH BASIN GRATE TYPE I



- 1) FOUR-SIDED FRAME IS REQUIRED.
- (2) CONTRACTOR HAS THE OPTION OF WELDING THE BACK STEEL ANGLE BAR INTO PLACE AFTER SLIP FORMS FOR BOX HAVE BEEN REMOVED, ENSURE GRATE FRAME IS SQUARE BEFORE DOING A FULL PENETRATION WELD TO ATTACH BACK STEEL ANGLE BAR.

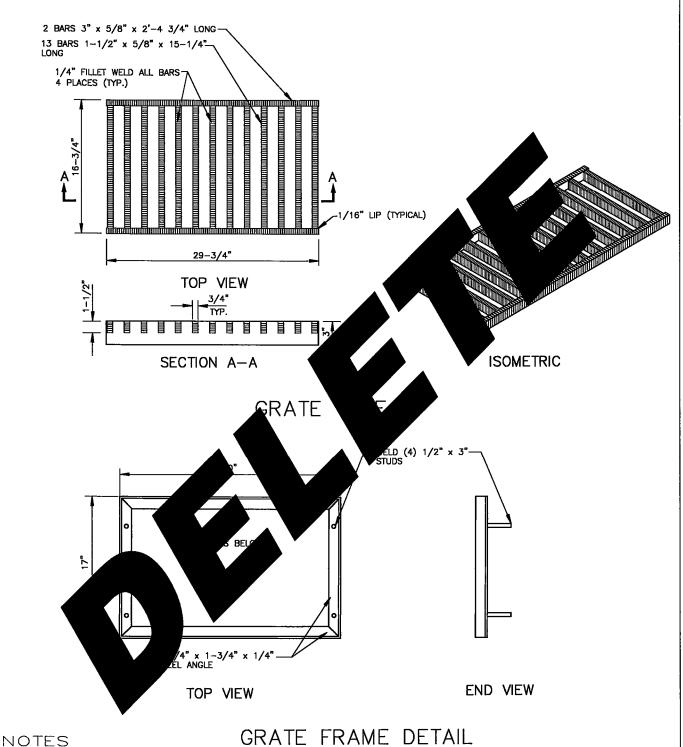
N.T.S.

LEGEND

- 1) 1-1/2" x 3/4" STEEL BARS (TYP.).
- 2 1/4° FILLET WELD ALL BARS 4 PLACES (TYP.).
- 3 WELD (4) 1/2"x3" STUDS.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CATCH BASIN GRATE
TYPE II

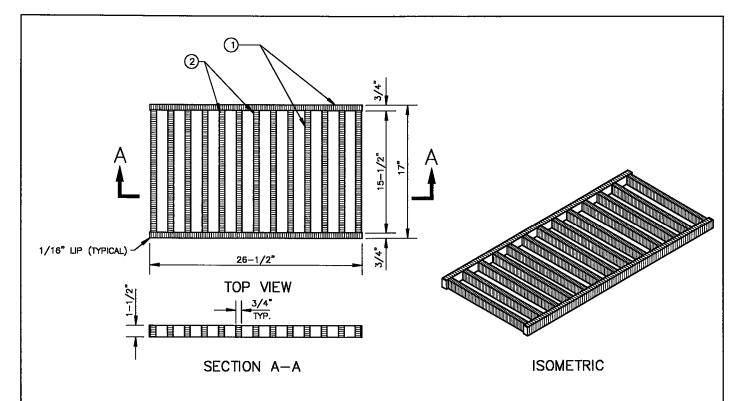


(A) FOUR-SIDED FRAME IS REQUIRED.

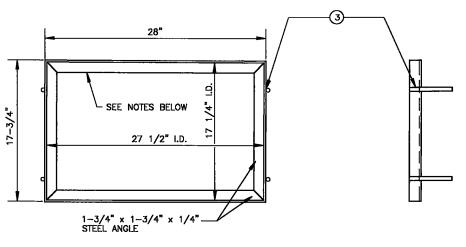
(B) CONTRACTOR HAS THE OPTION OF WELDING THE BACK STEEL ANGLE BAR INTO PLACE AFTER SLIP FORMS FOR BOX HAVE BEEN REMOVED. ENSURE GRATE FRAME IS SQUARE BEFORE DOING A FULL PENETRATION WELD TO ATTACH BACK STEEL ANGLE BAR.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CATCH BASIN GRATE TYPE III



GRATE TYPE III



TOP VIEW

END VIEW

NOTES

GRATE FRAME DETAIL

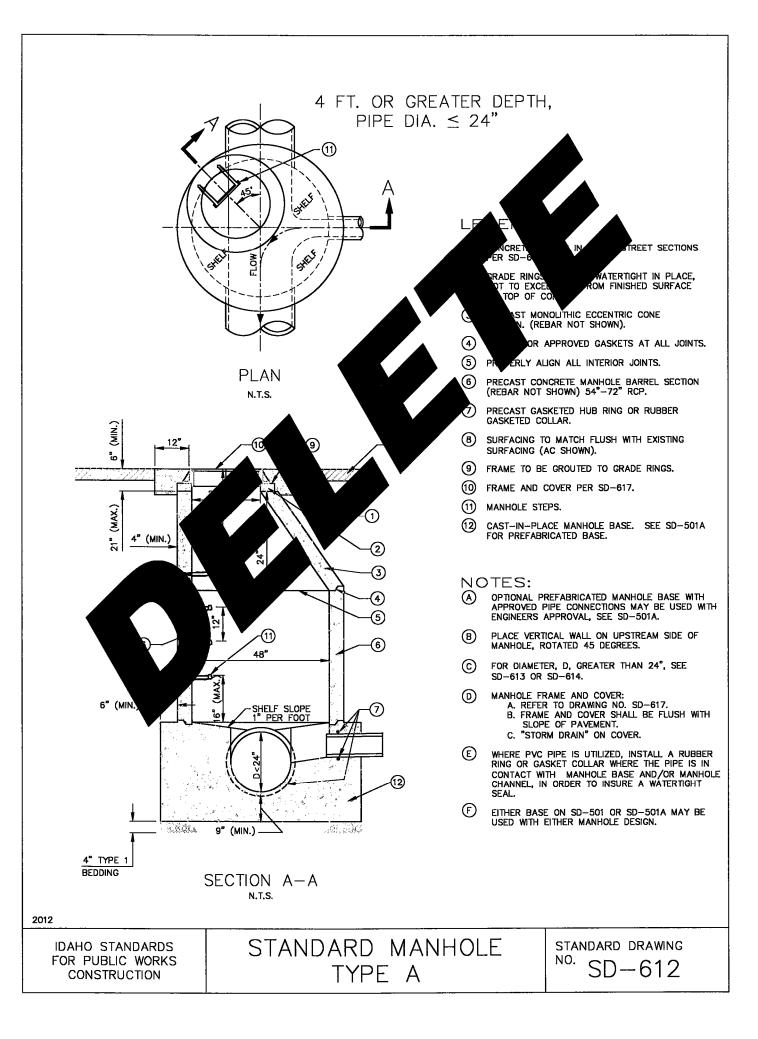
(A) FOUR-SIDED FRAME IS REQUIRED.

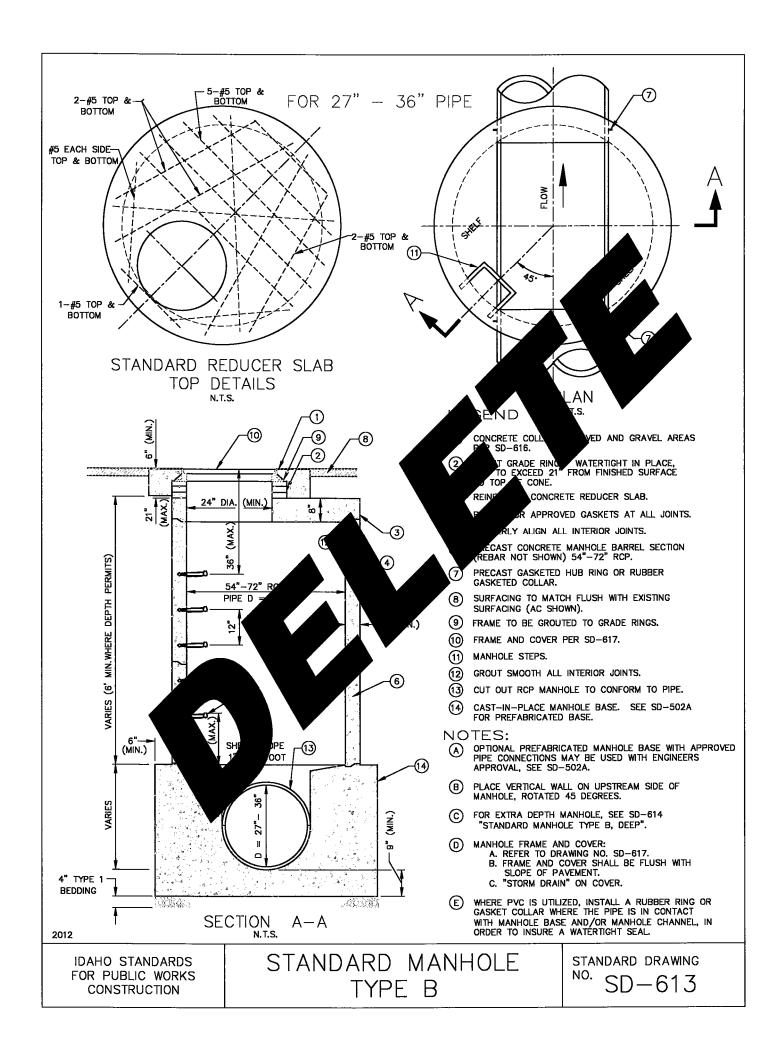
LEGEND

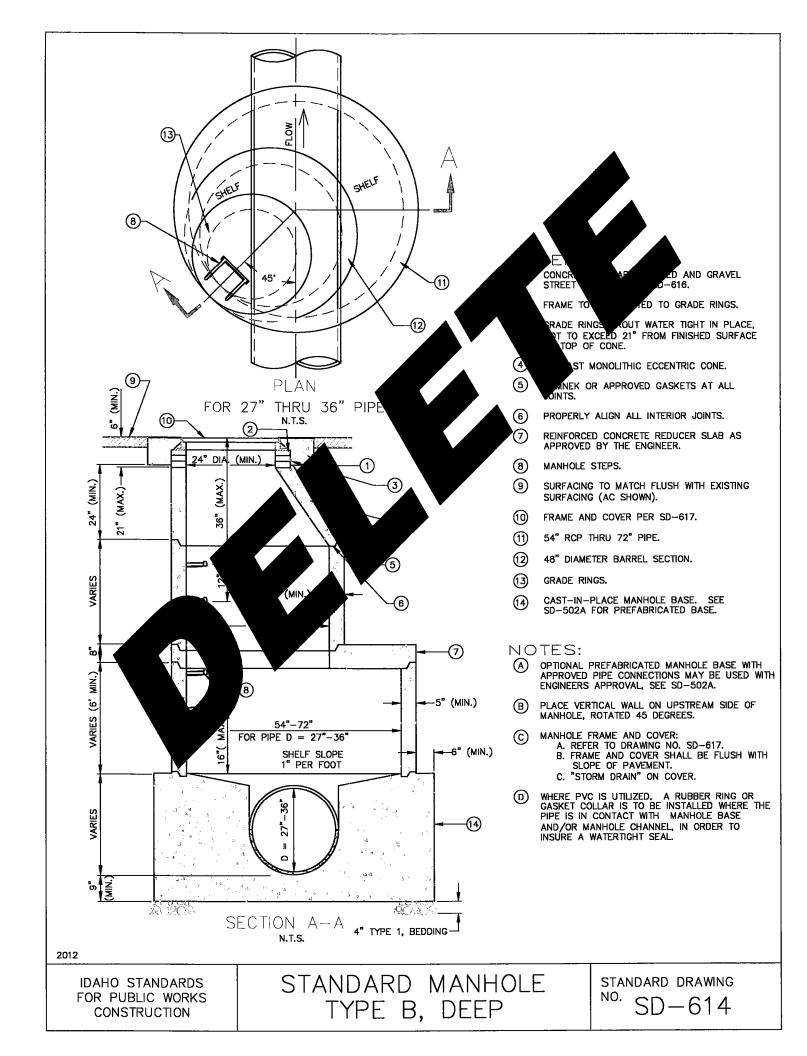
- 1) 1-1/2" x 3/4" STEEL BARS (TYP.).
- 2 1/4" FILLET WELD ALL BARS. 4 PLACES (TYP.)
- (3) WELD (4) 1/2"x7" STUDS.

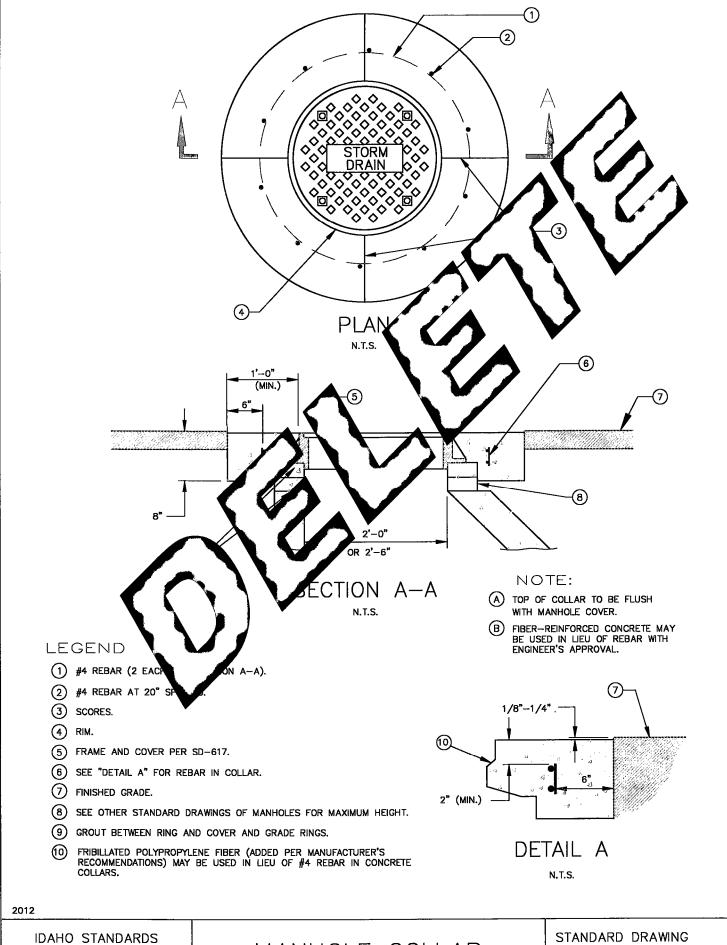
ACHD REVISION 2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CATCH BASIN GRATE
TYPE III



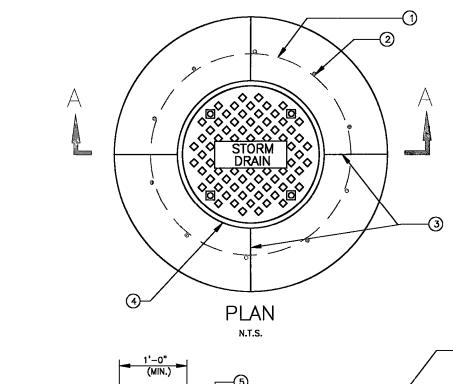


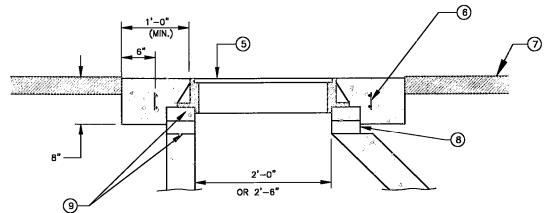




FOR PUBLIC WORKS
CONSTRUCTION

MANHOLE COLLAR





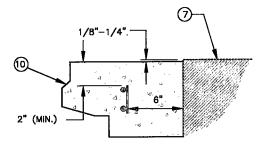
SECTION A-A

NOTE:

- (A) TOP OF COLLAR TO BE FLUSH WITH MANHOLE COVER.
- B 3LB PER CY OF FIBER-REINFORCED CONCRETE MAY BE USED IN LIEU OF REBAR WITH ENGINEER'S APPROVAL.

LEGEND

- 1 #4 REBAR (2 EACH) SEE SECTION A-A).
- 2 #4 REBAR AT 20" SPACING.
- 3 SCORES.
- 4 RIM.
- 5) FRAME AND COVER PER SD-617.
- (6) SEE "DETAIL A" FOR REBAR IN COLLAR.
- 7 FINISHED GRADE.
- (8) SEE OTHER STANDARD DRAWINGS OF MANHOLES FOR MAXIMUM HEIGHT.
- (9) GROUT BETWEEN RING AND COVER AND GRADE RINGS.
- (1) FRIBILLATED POLYPROPYLENE FIBER (1 1/2 LBS. PER CY) MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE COLLARS.

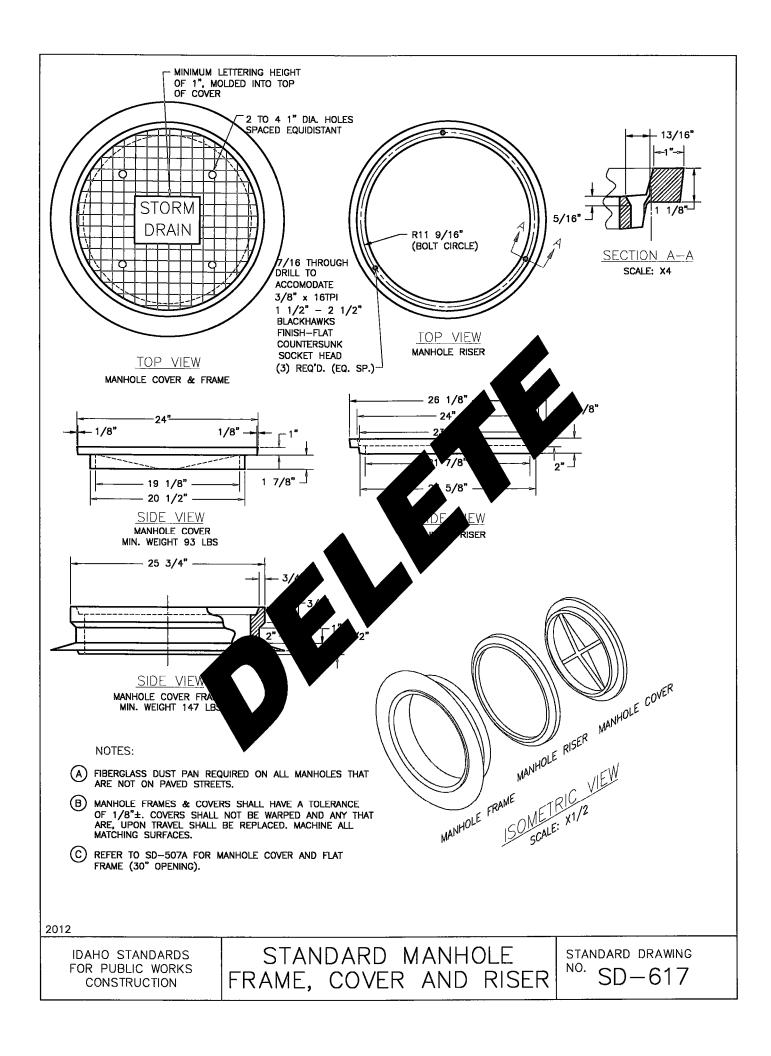


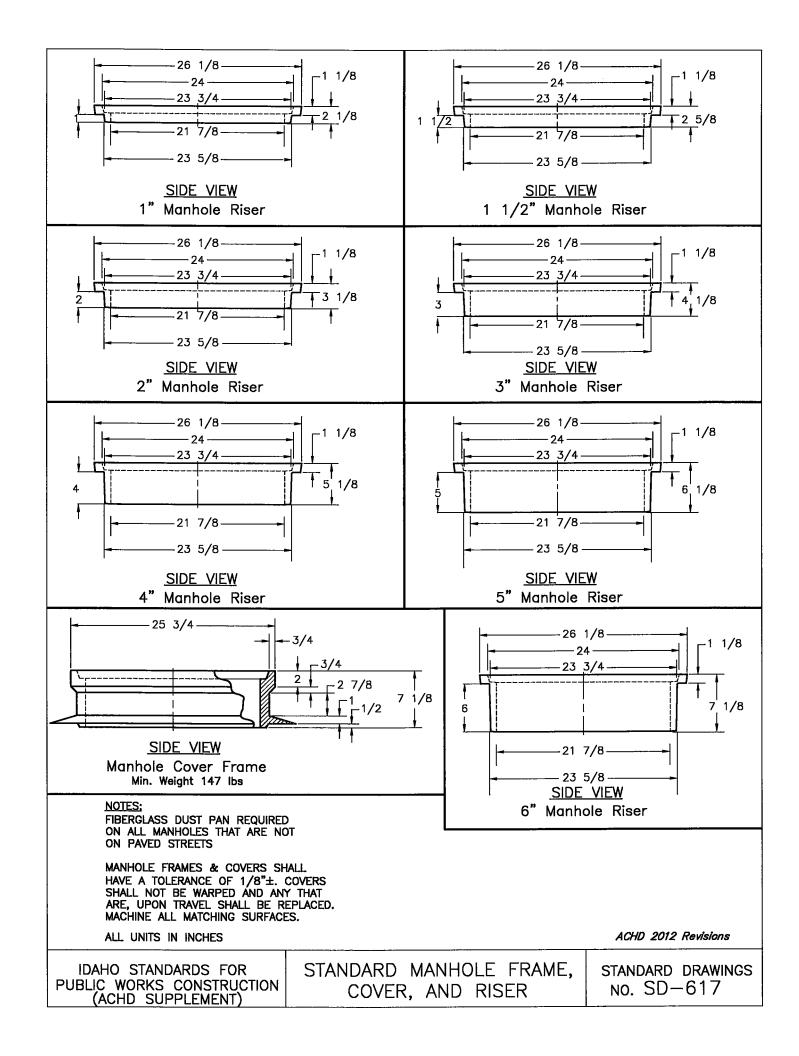
DETAIL A

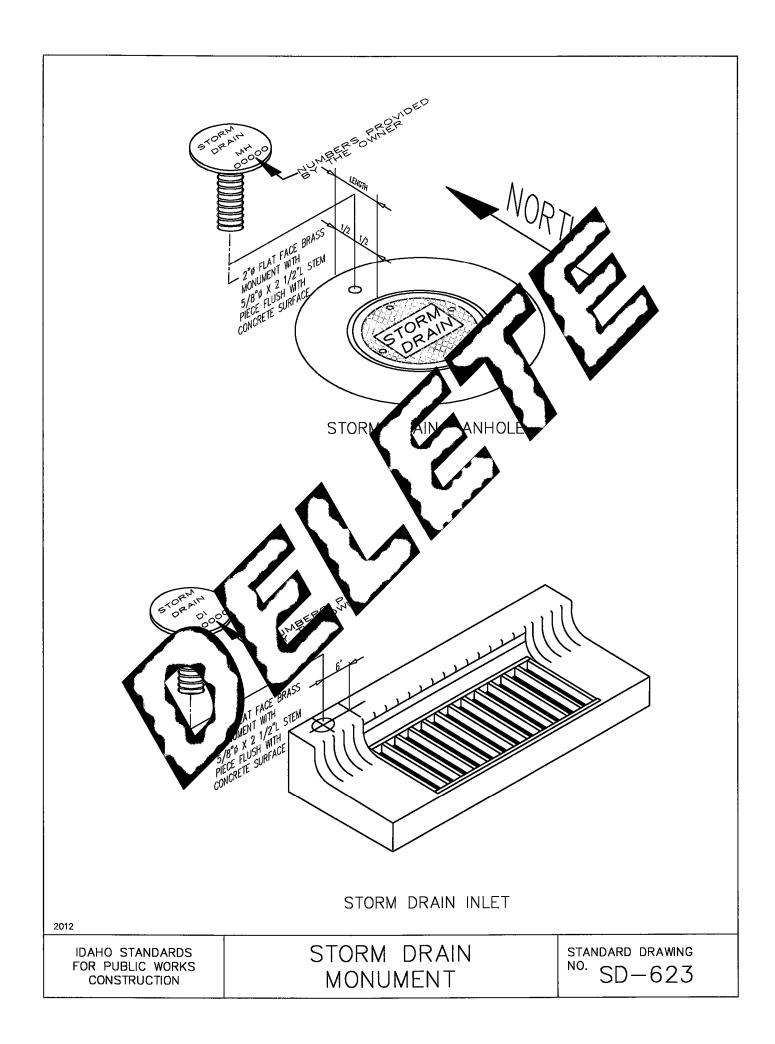
ACHD 2012 REVISION

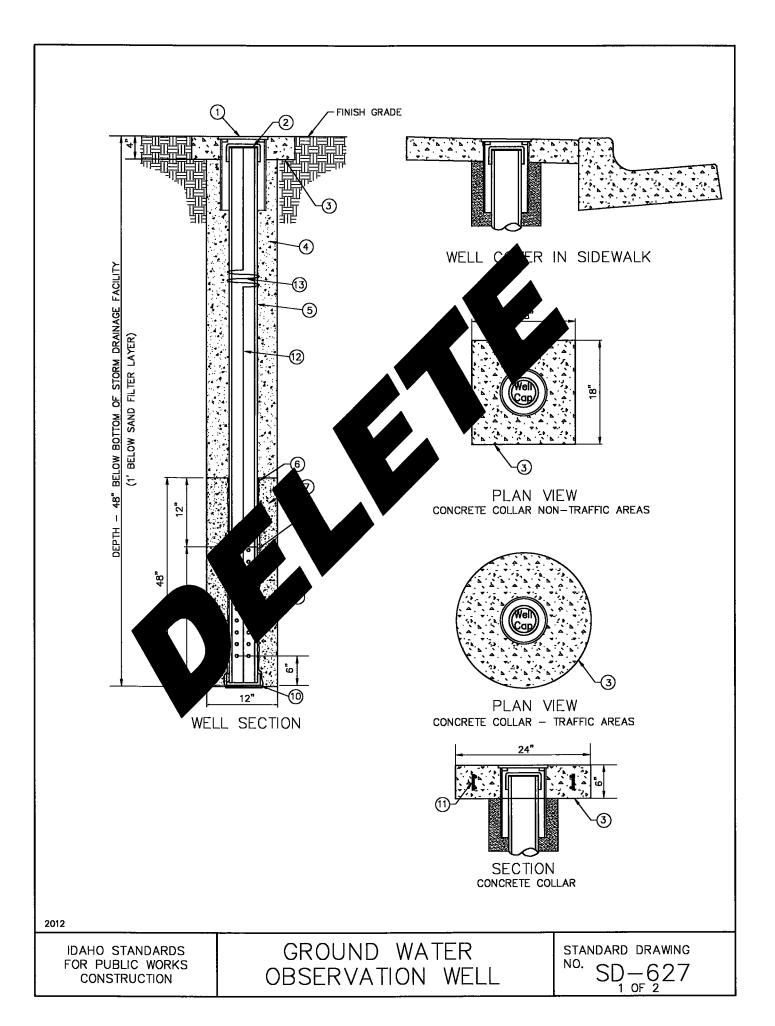
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

MANHOLE COLLAR









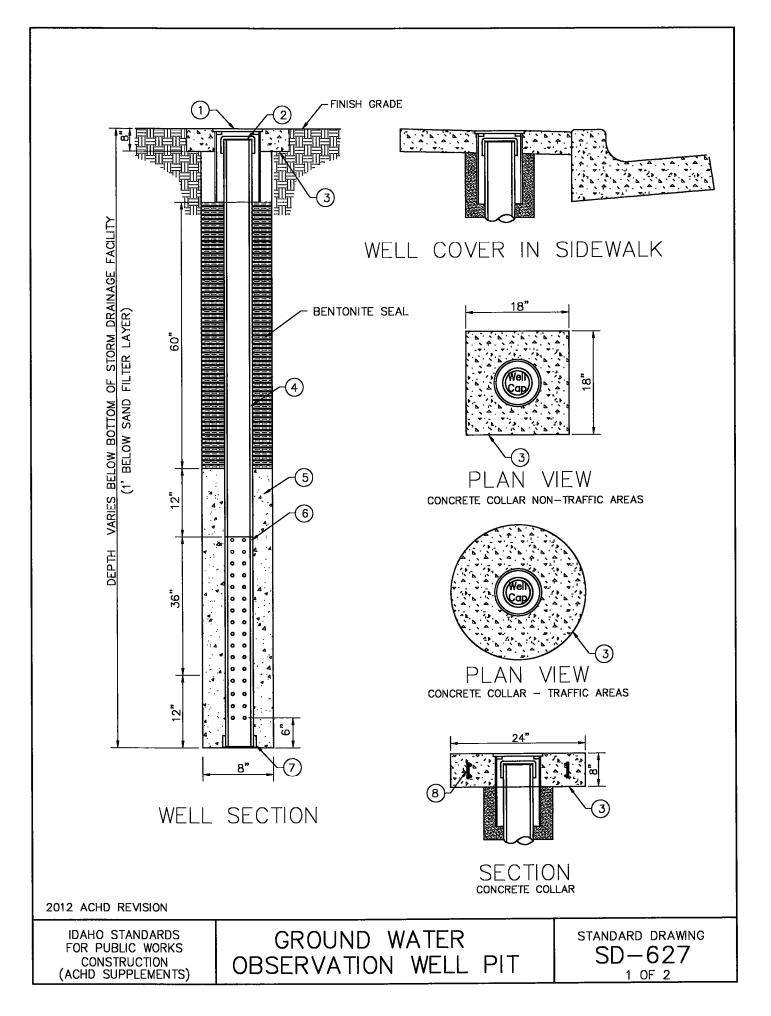
LEGEND

- (2) PVC CAP, GASKETED (WATERTIGHT).
- 3 CONCRETE (COLLAR), CLASS 3000 (ISPWC 3),
- (4) 3/4" MINUS CRUSHED AGGREGATE FOR SE (ISPA CTION 802) OR MATERIAL REQUIRED FOR STORM DRAINAGE FACILITY (I.F. PRAIN ROCK FOR SAND).
- (5) PVC PIPE, 4" DIAMETER ASTM P 4 5 35
- (6) 2 STAINLESS STEEL HOSE CLAUSE STATE STATE OF SECURE GEOTEXTILE IN PLACE.
- 7 FILTER SAND (ISPWC SECTION 801)
- (8) PERFORATED PVC P STM D-303 35 WITH 6 3/8" DIA. HOLES AT 3" ON CENTER.
- 9 DRAINAGE GEOTATILE I (ISTA SECTION 2060).
- 10 PVC CAP, MEL KETED (WATERTIGHT).
- (11) (2) #4 P S WIT VERTICALS.
- 12 NO. 12 A ANY FINDER WIRE.
- (13) 6" L V /LS.

TES:

- LLS FOR OBSERVATION OF GROUNDWATER LEVEL NEAR STORM DRAINAGE
- (B) ON OF GROUNDWATER OBSERVATION WELLS SHALL BE APPROVED BY ENGINEER.

2012



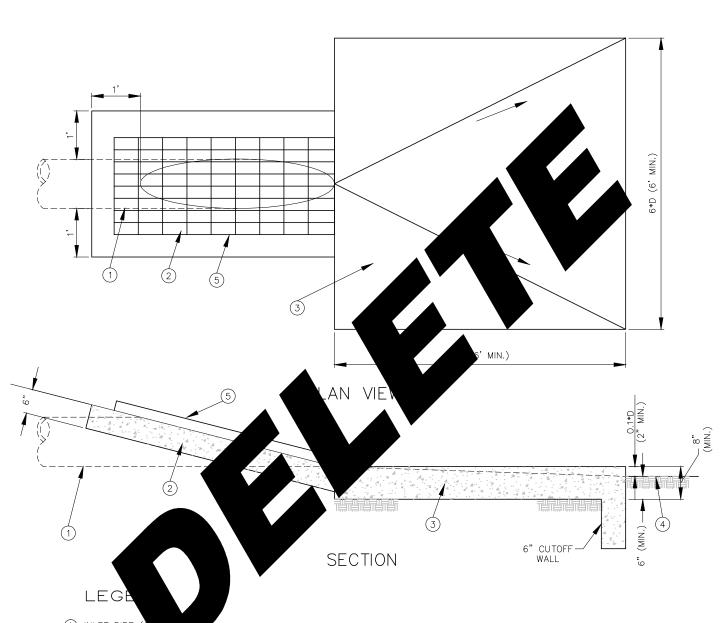
LEGEND

- (1) WELL COVER, 8" DIAM. WATERTIGHT GALVANIZED STEEL COVER AND CANISTER.
- (2) PVC CAP, GASKETED (WATERTIGHT).
- 3 CONCRETE (COLLAR), CLASS 3000 (ISPWC SECTION 703).
- (4) PVC PIPE, 2" DIAMETER SCHEDULE 40 WITH 0-.02" MANUFACTURER SLOTS.
- 5 FILTER SAND (ISPWC SECTION 801) OR 10-20 FILTER SAND.
- 6 PERFORATED PVC PIPE, ASTM D-3035 SDR 35 WITH 6 3/8" DIA. HOLES AT 3" ON CENTER.
- (7) PVC CAP, SOLVENT WELDED OR GASKETED (WATERTIGHT).
- (8) (2) #4 REBAR HOOPS WITH #4 VERTICALS.

NOTES:

- (A) WELLS ARE FOR OBSERVATION OF GROUNDWATER LEVEL NEAR STORM DRAINAGE FACILITIES
- (B) LOCATION OF GROUNDWATER OBSERVATION WELLS SHALL BE APPROVED BY ENGINEER.

2012 ACHD REVISION

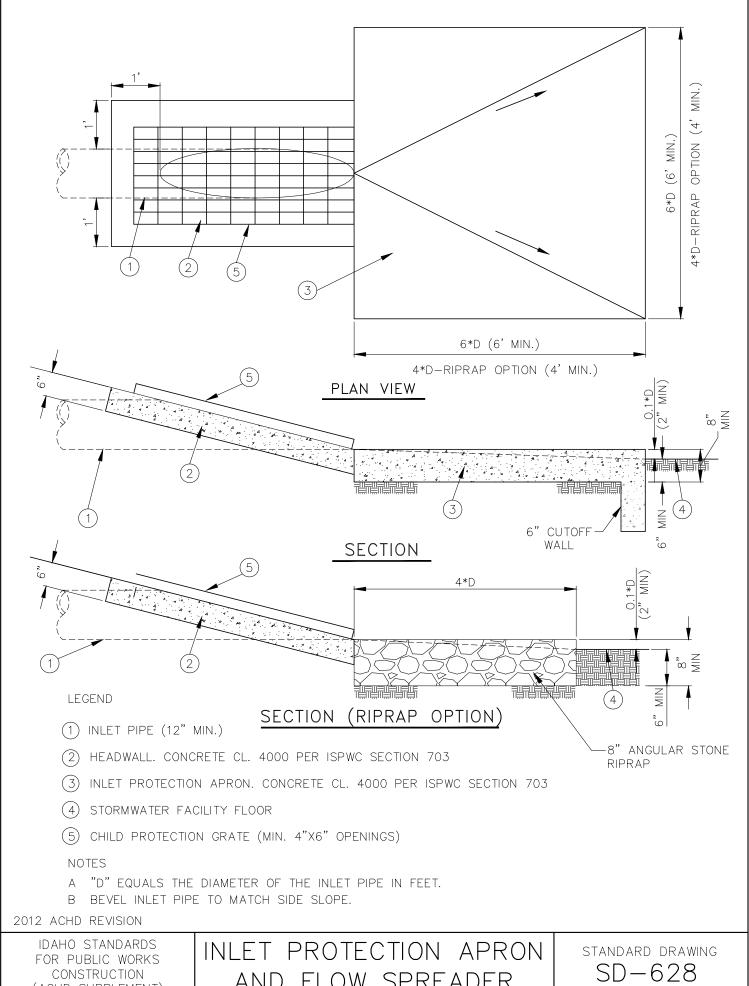


- 1) INLET PIPE (1
- (2) HEADWALL. CON CL. 4000 PER ISPWC SECTION 703.
- 3 INLET PROTECTION APRON. CONCRETE CL. 4000 PER ISPWC SECTION 703.
- 4 STORMWATER FACILITY FLOOR.
- 5 CHILD PROTECTION GRATE (MAX. 4"X6" OPENINGS).

- (A) "D" EQUALS THE DIAMETER OF THE INLET PIPE IN FEET.
- B BEVEL INLET PIPE TO MATCH SIDE SLOPE.

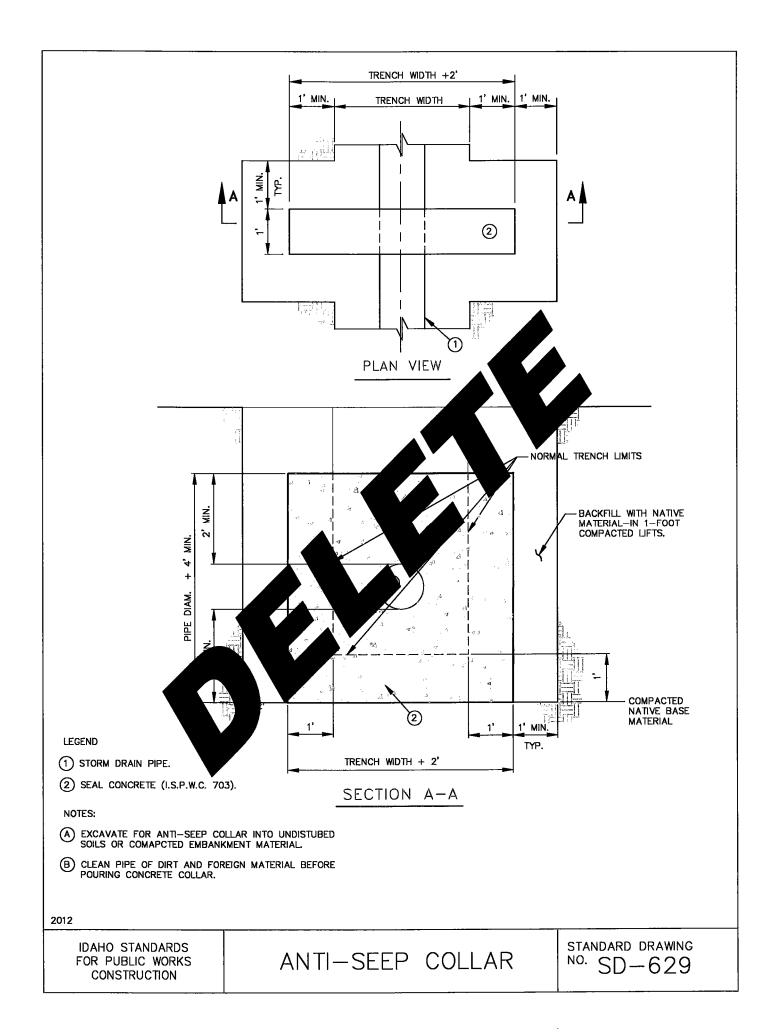
2012

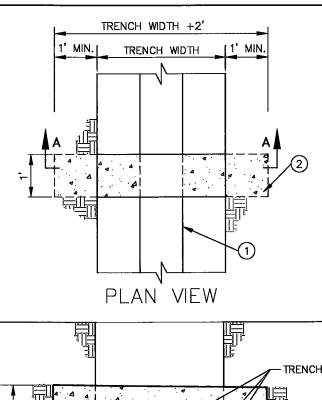
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION INLET PIPE AND PROTECTION APRON



(ACHD SUPPLEMENT)

AND FLOW SPREADER





TRENCH LIMITS

TRENCH WIDTH + 2'

SECTION A-A

LEGEND

- (1) STORM DRAIN PIPE
- 2 SEAL CONCRETE (I.S.P.W.C. 703)

NOTES:

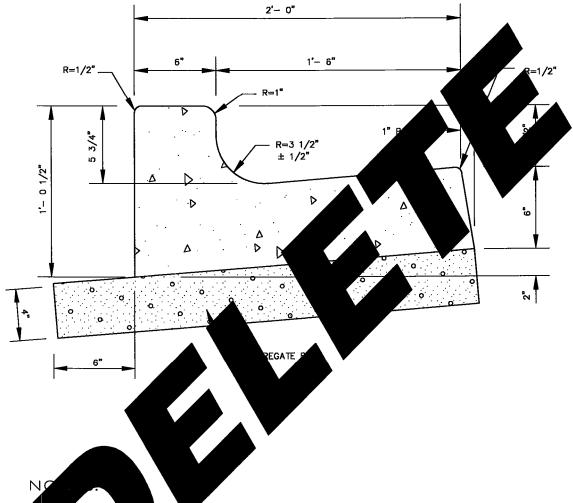
- A ANTI-SEEP COLLAR TO BE USED IN MAN MADE EMBANK-MENTS
- B EXCAVATE FOR ANTI—SEEP COLLAR INTO UNDISTUBED SOILS OR COMAPCTED EMBANKMENT MATERIAL.
- C CLEAN PIPE OF DIRT AND FOREIGN MATERIAL BEFORE POURING CONCRETE COLLAR.

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IDAHO STANDARD FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENTS)

ANTI-SEEP COLLAR

SD-629



- TO BE STABLISHED OR APPROVED BY THE ENGINEER AND ING JURISDICTION. AND ALIG
- ED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS DER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR. ⑱
- 0 CONT ENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING ITH 2X SIDEWALK WIDTH FOR SCORE SPACING).
- (D) MATERIAL ND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- E BACKFILL AS PER SECTION-706.
- F SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- G STANDARD CURB TO BE USED ON:

 1. COLLECTOR AND ARTERIAL STREETS, UNLESS OTHERWISE INDICATED.

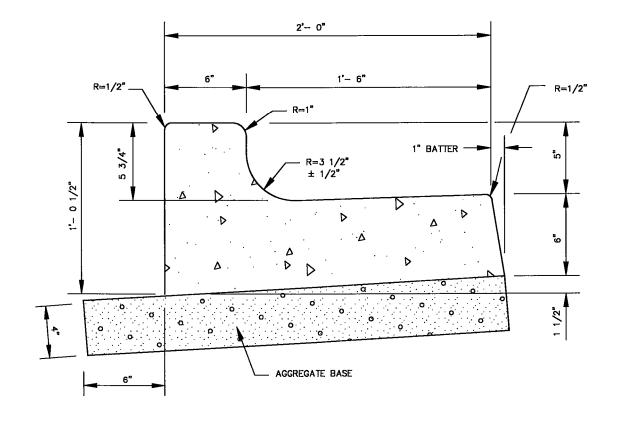
 2. ALL RADII PLUS 5-FEET EACH END WITH 2-FEET TRANSITION TO ROLL CURB.

 3. TO MATCH EXISTING CURBS.

 4. SEE SD-709 FOR CURB CONSTRUCTION WHEN SIDEWALK IS INCLUDED.

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

6" VERTICAL CURB AND GUTTER



- GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.
- BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR.
- CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING (OR CONSISTENT WITH 2X SIDEWALK WIDTH FOR SCORE SPACING).
- (D) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL AS PER SECTION-706.
- F SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- **©**
- STANDARD CURB TO BE USED ON:

 1. COLLECTOR AND ARTERIAL STREETS, UNLESS OTHERWISE INDICATED.

 2. ALL RADII PLUS 5-FEET EACH END WITH 2-FEET TRANSITION TO ROLL CURB.

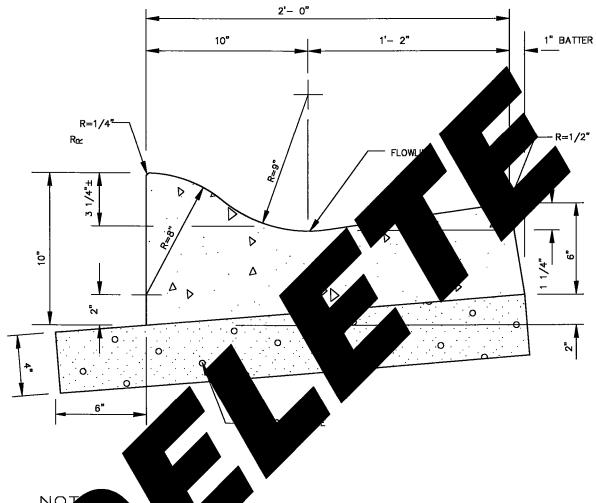
 3. TO MATCH EXISTING CURBS.

 4. SEE SD-709 FOR CURB CONSTRUCTION WHEN SIDEWALK IS INCLUDED.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

6" VERTICAL CURB AND GUTTER



NO

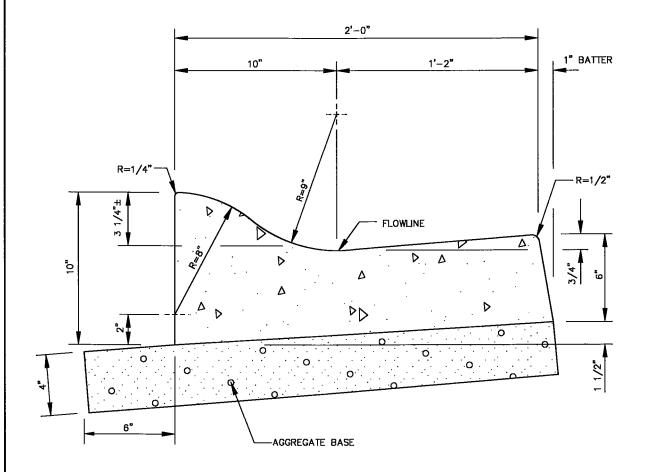
- ABLISHED OR APPROVED BY THE ENGINEER AND RISDICTION.
- PACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACED AS UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR. 4-INC IED AN
- **©** MENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING (OR CONSISTENT WIDTH FOR SCORE SPACING.)
- 0 CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- € S PER ISPWC SECTION-706.
- SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- USE ROLLED CURB IN RESIDENTIAL AREAS. WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS VERTICAL CURB LENGTH TO BE FULL RADIUS PLUS 5 FEET AT EACH END. TRANSITION LENGTH FROM ROLLED CURB TO VERTICAL CURB 2 FEET. **6**

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

3" ROLLED CURB AND GUTTER

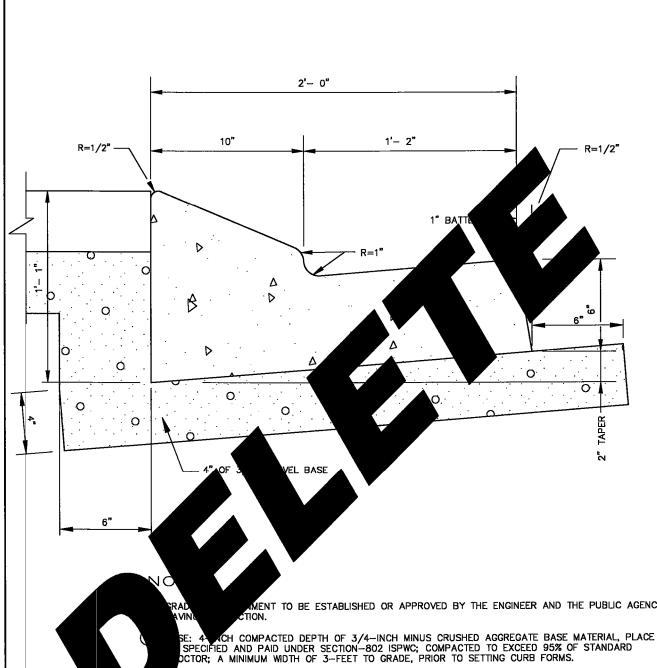
STANDARD DRAWING SD - 702



- (A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.
- BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACED AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR.
- © CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING (OR CONSISTENT WITH 2× SIDEWALK WIDTH FOR SCORE SPACING.)
- D MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL AS PER ISPWC SECTION-706.
- F SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- G USE ROLLED CURB IN RESIDENTIAL AREAS. WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS VERTICAL CURB LENGTH TO BE FULL RADIUS PLUS 5 FEET AT EACH END. TRANSITION LENGTH FROM ROLLED CURB TO VERTICAL CURB 2 FEET.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) 3" ROLLED CURB AND GUTTER



MENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY

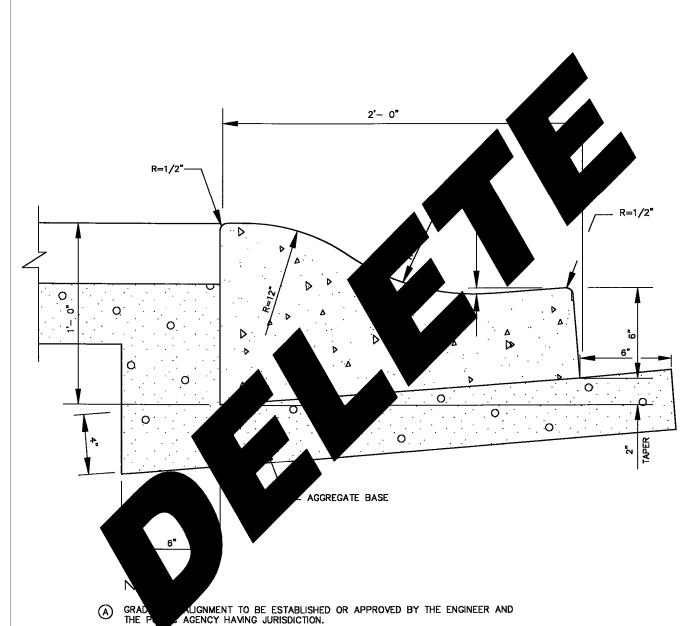
ONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 10-FEET MAXIMUM SPACING OR CONSISTENT 2X SIDEWALK WIDTH FOR SCORE SPACING).

- (5) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL AS PER ISPWC SECTION-706.
- SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE I CURB TO VERTICAL CURB 2 FEET.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

CURB AND GUTTER TYPE I

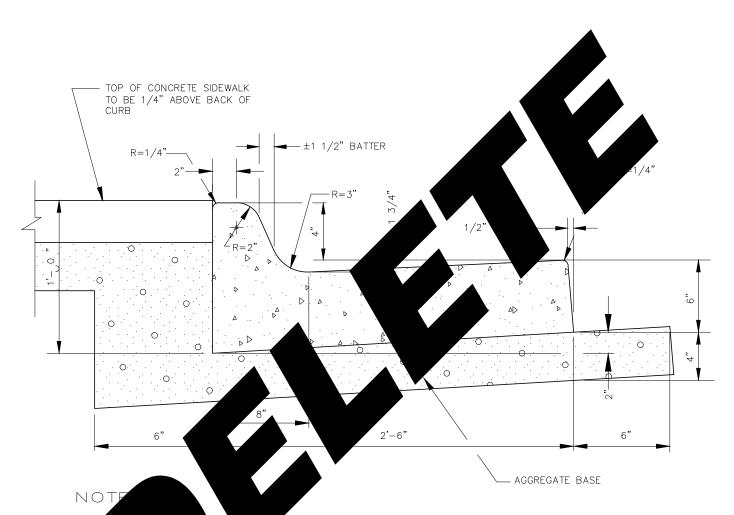


- GRAD THE P
- BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACED AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MINIMUM WIDTH OF 3-FEET TO GRADE, PRIOR TO SETTING CURB FORMS.
- CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 10-FEET MAXIMUM SPACING OR CONSISTENT WITH 2x SIDEWALK WIDTH FOR SCORE SPACING).
- (D) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL AS PER ISPWC SECTION-706.
- (F) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTION, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE II CURB TO VERTICAL CURB 2 FEET. **6**

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

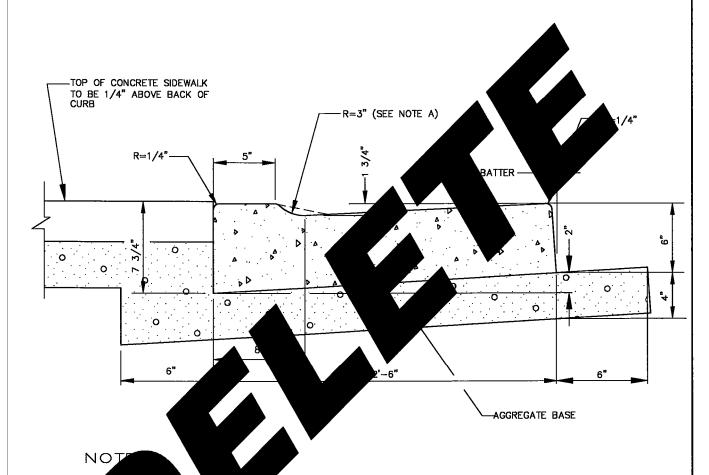
CURB AND GUTTER TYPE II

STANDARD DRAWING SD - 704



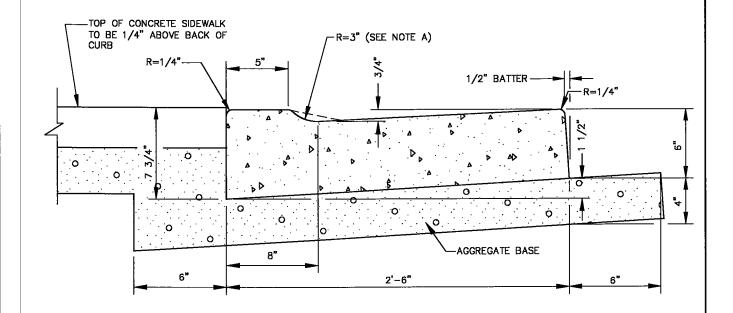
- (A) P TO ALL TO SLISHED OR APPROVED BY THE ENGINEER AND VING DICTION.
- B INCH CO ED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS AND PARTIES AND PARTIES AND PARTIES AND PARTIES TO GRADE, PRIOR TO SETTING CURB FORMS.
- C) CONTI
- (D) MATERIA CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL PER ISPWC SECTION-706.
- (F) secure right-of-way permit before beginning construction in public right-of-way.
- (G) WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE III CURB TO VERTICAL CURB 2 FEET.
- (H) SEE SD-706 FOR TYPE III CURB CUT.

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CURB AND GUTTER
TYPF III



- ABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY ON IN LAA.
- SE: 4-INC PACTE CEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MM WIDT 3-FEET 6-INCHES TO GRADE, PRIOR TO SETTING CURB FORMS.
- © MENT PREFERRED, SCORE INTERVALS 8-FEET MAXIMUM SPACING.
- CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- E BACK S PER ISPWC SECTION-706.
- (F) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- WHEN LOCAL JURISDICTION REQUIRES CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5-FEET TANGENT AT EACH END. TRANSITION FROM TYPE III CURB TO VERTICAL CURB 2 FEET.
- (H) FOR PEDESTRIAN RAMPS, CONSTRUCT TRANSITION PER A.D.A. REQUIREMENTS IN LIEU OF 3" RADIUS.

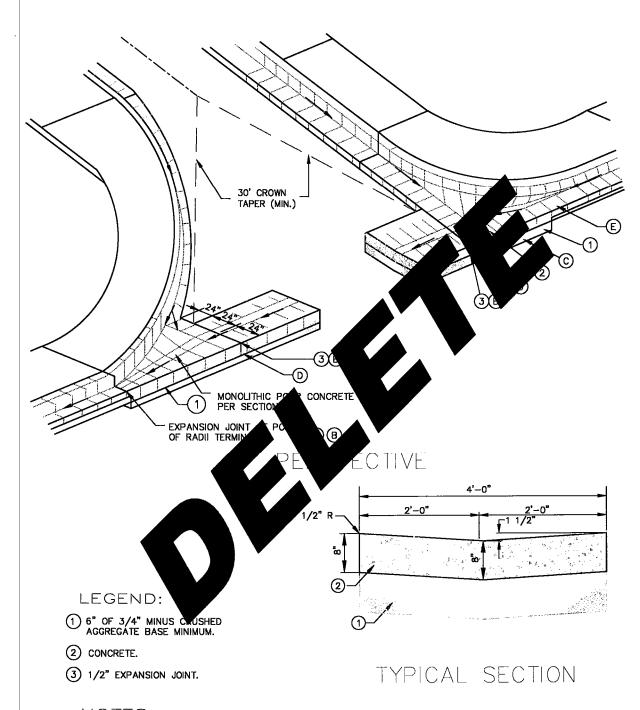
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CURB CUT DETAIL
CURB TYPE III



- (A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION IN THIS AREA.
- BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MINIMUM WIDTH OF 3-FEET 6-INCHES TO GRADE, PRIOR TO SETTING CURB FORMS.
- C CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 8-FEET MAXIMUM SPACING.
- (D) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.
- (E) BACKFILL AS PER ISPWC SECTION-706.
- (F) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.
- WHEN LOCAL JURISDICTION REQUIRES CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5-FEET TANGENT AT EACH END. TRANSITION FROM TYPE III CURB TO VERTICAL CURB 2 FEET.
- (H) FOR PEDESTRIAN RAMPS, CONSTRUCT TRANSITION PER A.D.A. REQUIREMENTS IN LIEU OF 3" RADIUS.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CURB CUT DETAIL
CURB TYPE III

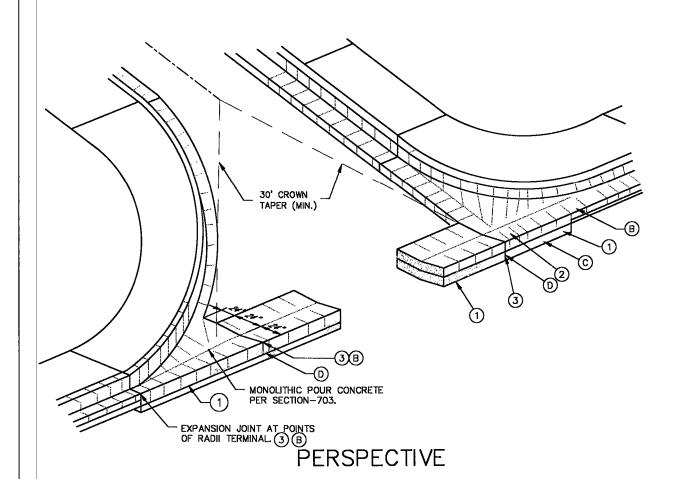


- A GRADE OF GUTTER MINIMUM 0.4%.
- (B) EXPANSION JOINT 1/2-INCH PREFORMED JOINT MATERIAL (AASHTO M 213).
- (C) FILLET AND BASE SECTION THICKNESS SHALL MATCH THE VALLEY GUTTER, TYPICAL.
- D PAY LIMITS FOR VALLEY GUTTER.
- (E) FILLET DETAIL FOR CORNER RADIUS 15 FEET OR LESS.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

VALLEY GUTTER



1/2" R



- 1) 6" OF 3/4" MINUS CRUSHED AGGREGATE BASE MINIMUM.
- 2 CONCRETE.
- 3 1/2" EXPANSION JOINT.

TYPICAL SECTION

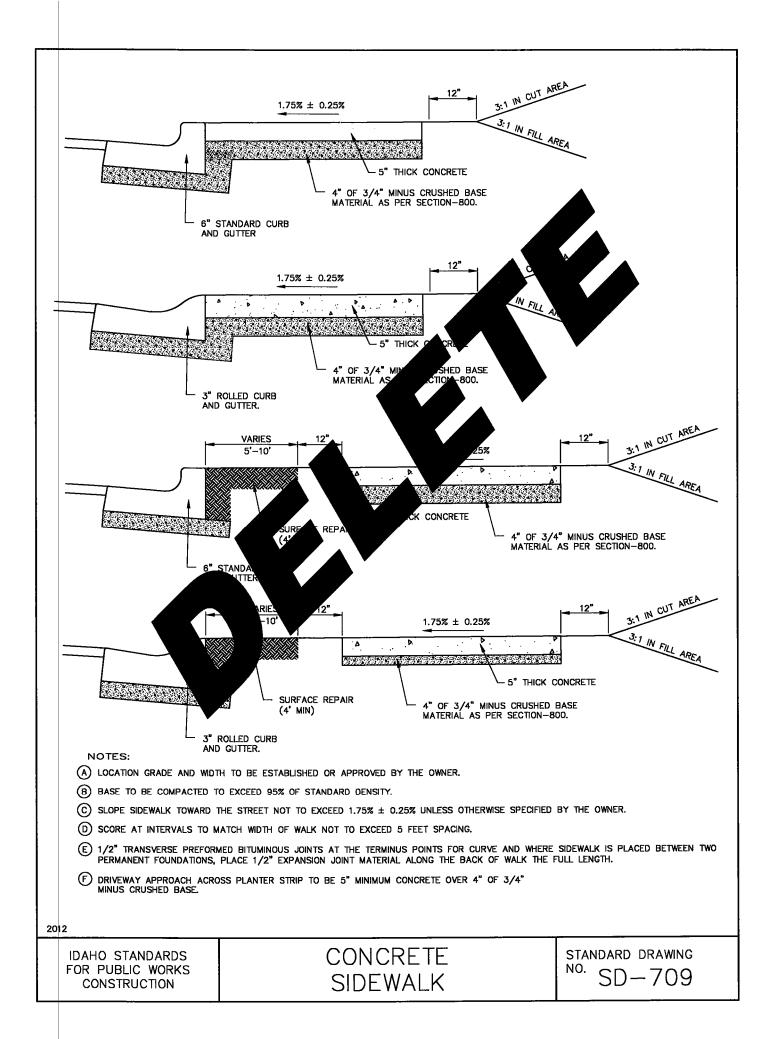
NOTES:

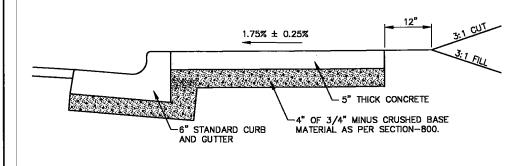
- A GRADE OF GUTTER MINIMUM 0.4%
- (B) FILLET DETAIL FOR CORNER RADIUS 15 FEET OR LESS.
- © FILLET AND BASE SECTION THICKNESS SHALL MATCH THE VALLEY GUTTER, TYPICAL.
- D PAY LIMITS FOR VALLEY GUTTER.

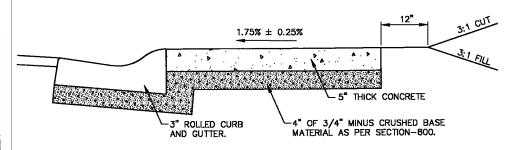
2012 ACHD REVISION

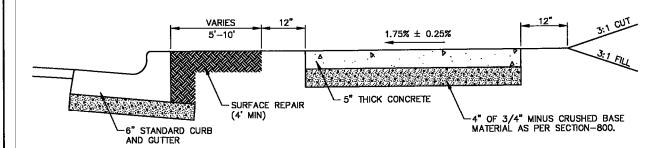
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

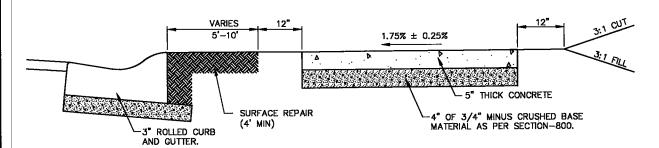
VALLEY GUTTER







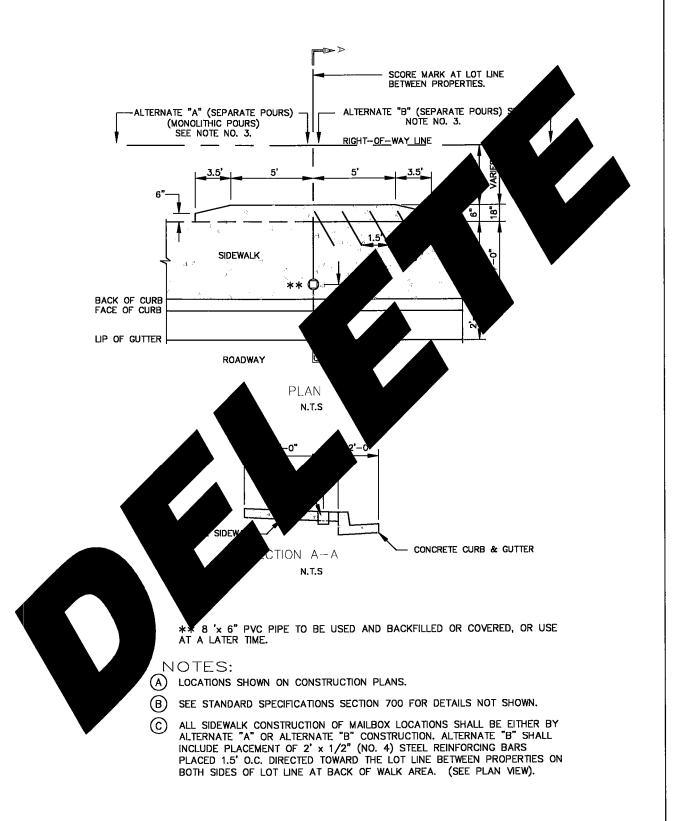




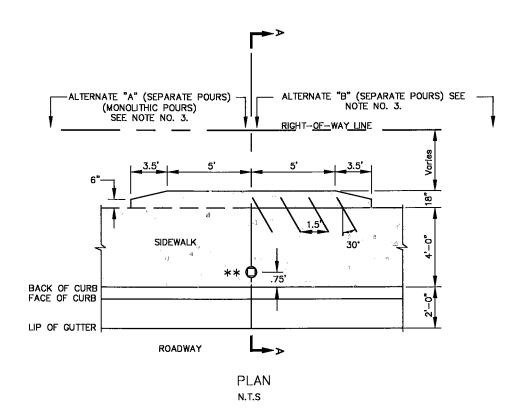
- (A) LOCATION GRADE AND WIDTH TO BE ESTABLISHED OR APPROVED BY THE OWNER.
- (B) BASE TO BE COMPACTED TO EXCEED 95% OF STANDARD DENSITY.
- C SLOPE SIDEWALK TOWARD THE STREET NOT TO EXCEED 1.75% ± 0.25% UNLESS OTHERWISE SPECIFIED BY THE OWNER.
- (D) SCORE AT INTERVALS TO MATCH WIDTH OF WALK NOT TO EXCEED 5 FEET SPACING.
- (E) 1/2" TRANSVERSE PREFORMED BITUMINOUS JOINTS AT THE TERMINUS POINTS FOR CURVE AND WHERE SIDEWALK IS PLACED BETWEEN TWO PERMANENT FOUNDATIONS, PLACE 1/2" EXPANSION JOINT MATERIAL ALONG THE BACK OF WALK THE FULL LENGTH.
- $\begin{picture}(60,0)\put(0,0){\line(1,0){10}}\put(0,0){\line(1,0){10}$

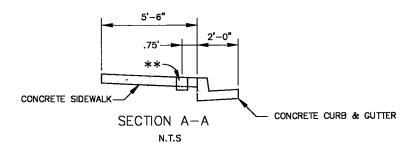
2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CONCRETE SIDEWALK



IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CURBSIDE MAIL BOX STAND





** 8"x6" DIA. PVC PIPE TO BE USED AND BACKFILLED OR COVERED, OR USE AT A LATER TIME.

NOTES:

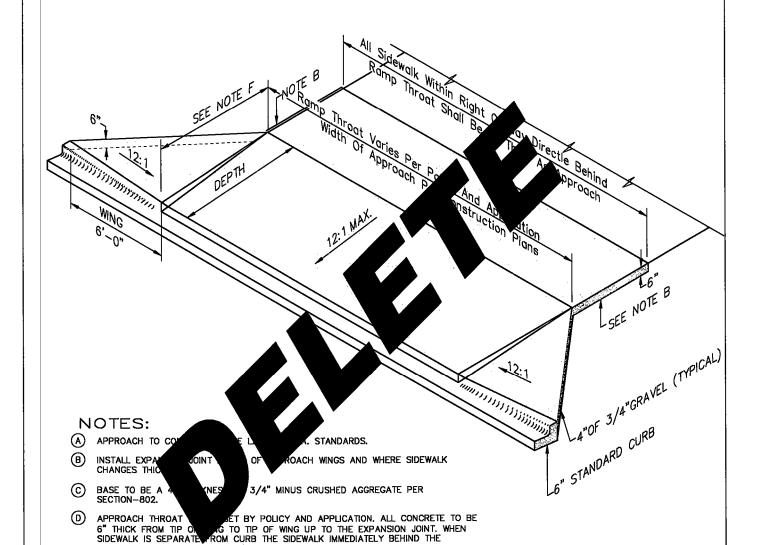
- (A) LOCATIONS SHOWN ON CONSTRUCTION PLANS.
- (B) SEE STANDARD SPECIFICATIONS SECTION 700 FOR DETAILS NOT SHOWN.
- C ALL SIDEWALK CONSTRUCTION OF MAILBOX LOCATIONS SHALL BE EITHER BY ALTERNATE "A" OR ALTERNATE "B" CONSTRUCTION. ALTERNATE "B" SHALL INCLUDE PLACEMENT OF 2' x 1/2" (NO. 4) STEEL REINFORCING BARS PLACED 1.5' O.C. DIRECTED TOWARD THE LOT LINE BETWEEN PROPERTIES ON BOTH SIDES OF LOT LINE AT BACK OF WALK AREA. (SEE PLAN VIEW).
- (D) 3' MINIMUM CLEARANCE REQUIRED BETWEEN BACK OF MAILBOX AND BACK OF SIDEWALK

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

CURBSIDE MAIL BOX STAND

standard drawing NO. SD-709A



E ALL CONCRETE SHALL BE CLASS 3000 PER SECTION-703.

APPROACH THROAT SHALL BE 6" THICK ALSO.

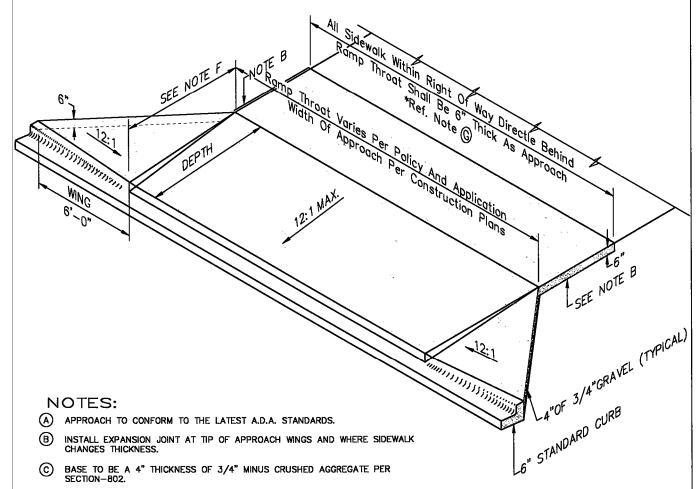
(F) APPROACH DIMENSIONS ARE BASED ON THE HEIGHT OF THE CURB. SEE TABLE BELOW.

APPROACH DIMENSION TABLE

Curb	3"	4"	5"	6"	7"	8"	
Depth	4'	5'	6'	7'	8'	9,	
Wing	3'	4'	5'	6'	7'	8'	
Throat Per Policy And Application Unless Otherwise							
Approved by Owner							

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CONCRETE DRIVEWAY APPROACH



- D APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- (E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION-703.
- APPROACH DIMENSIONS ARE BASED ON THE HEIGHT OF THE CURB. SEE TABLE BELOW.
- G IF APPROACH SERVES ONE SINGLE FAMILY RESIDENTIAL UNIT, SIDEWALK MAY BE 5"-THICK.

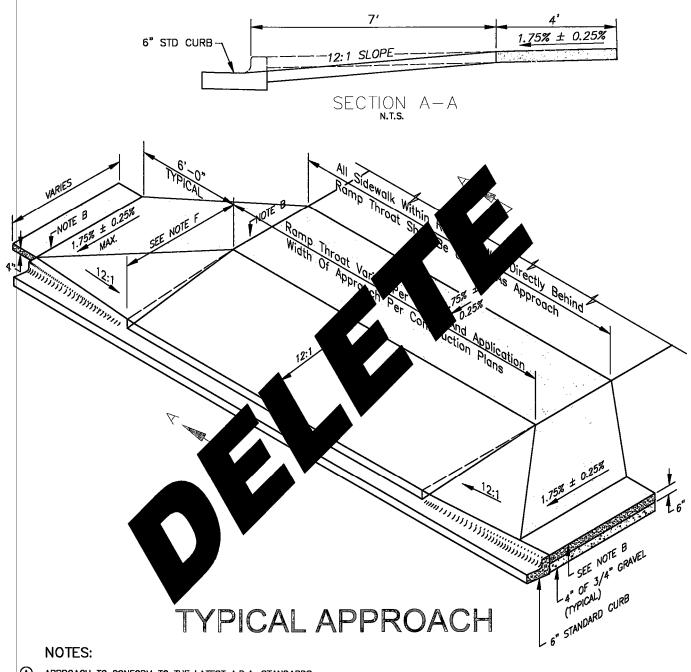
APPROACH DIMENSION TABLE

· · · · · · · · · · · · · · · · · · ·							
Curb	3"	4"	5"	6"	7°	8"	
Depth	4'	5'	6,	7'	8'	9'	
Wing	3'	4'	5'	6'	7'	8,	
Throat Per Policy And Application Unless Otherwise							
Approved by Owner							

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

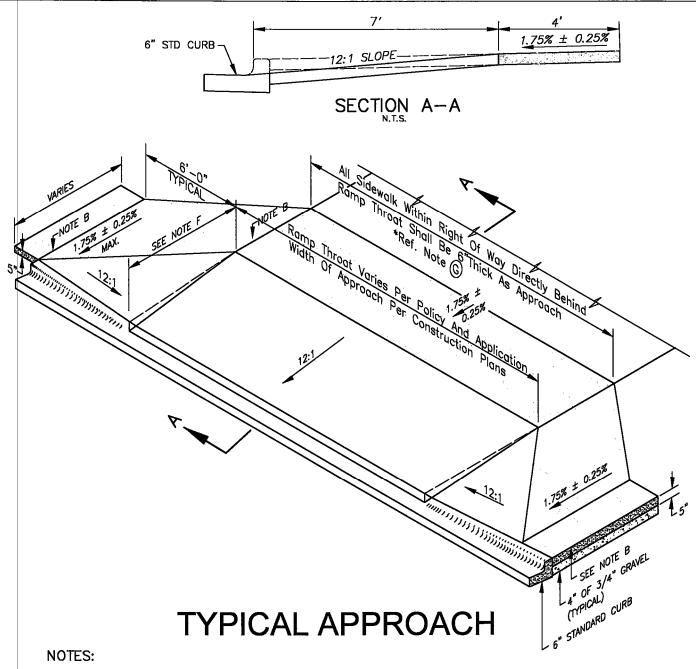
CONCRETE DRIVEWAY APPROACH



- APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- B INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- © BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION 802.
- D APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- F SIDEWALK WIDTH MAY VARY.

2012

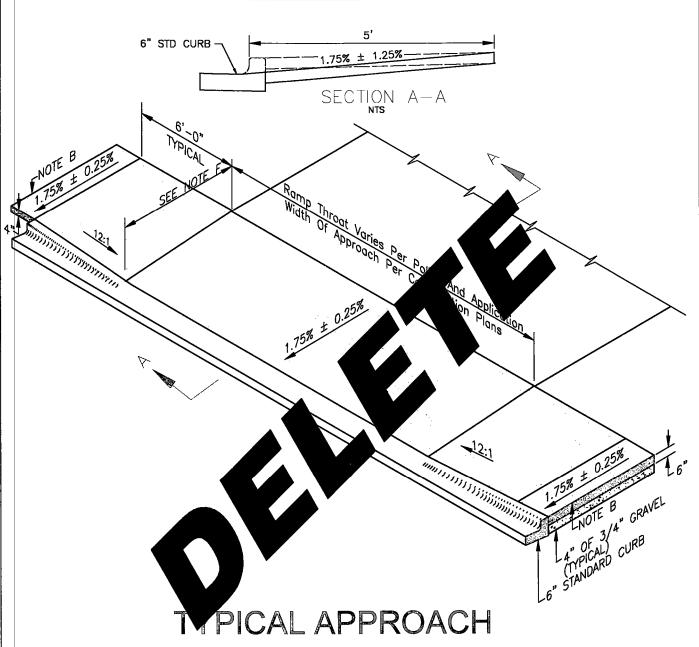
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CONCRETE DRIVEWAY WITH SIDEWALK AROUND APPROACH



- A APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- © BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION 802.
- APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT.
 WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- E ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- F SIDEWALK WIDTH MAY VARY.
- (G) IF APPROACH SERVES ONE SINGLE FAMILY RESIDENTIAL UNIT, SIDEWALK MAY BE 5"-THICK.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CONCRETE DRIVEWAY WITH SIDEWALK AROUND APPROACH

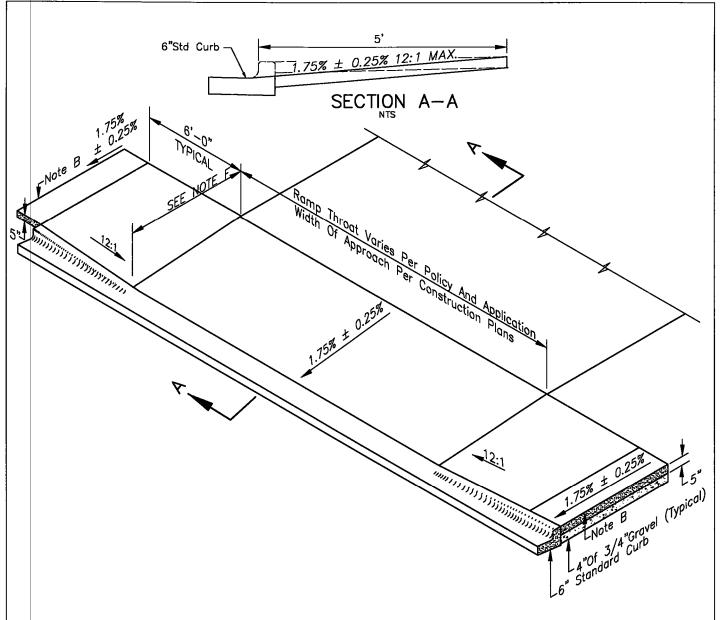


- A APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- B INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- © BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION -- 802.
- D APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- E ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- F SIDEWALK WIDTH MAY VARY.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CONCRETE DRIVEWAY WITH RAMPED SIDEWALK

standard drawing NO.SD-710B



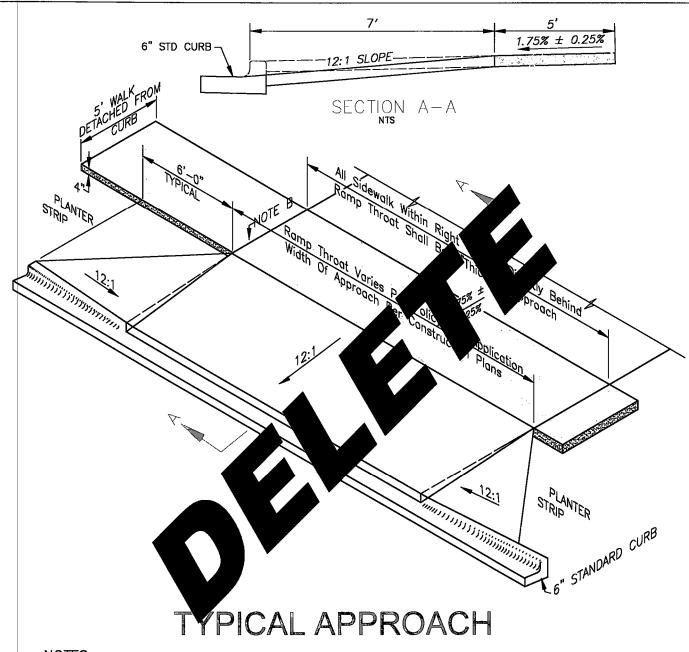
TYPICAL APPROACH

NOTES:

- APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION 802.
- APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE
 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT.
 WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- SIDEWALK WIDTH MAY VARY.

2012 ACHD REVISIONS

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CONCRETE DRIVEWAY WITH RAMPED SIDEWALK

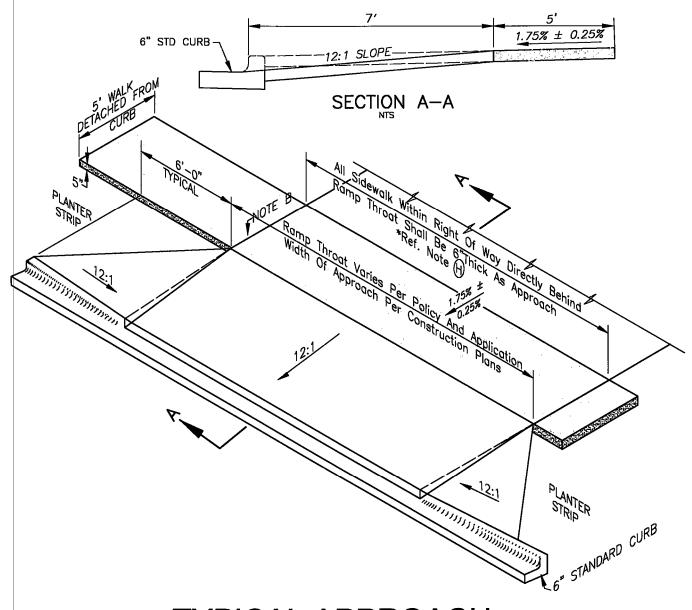


- A APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION — 802.
- APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT.

 WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- E ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- F SIDEWALK WIDTH MAY VARY.
- G ROUTING OF SIDEWALK AROUND APPROACH IS NOT NECESSARY WHEN THE PLANTING STRIP EQUALS OR EXCEEDS 6 FEET.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CONCRETE DRIVEWAY WITH DETACHED SIDEWALK



TYPICAL APPROACH

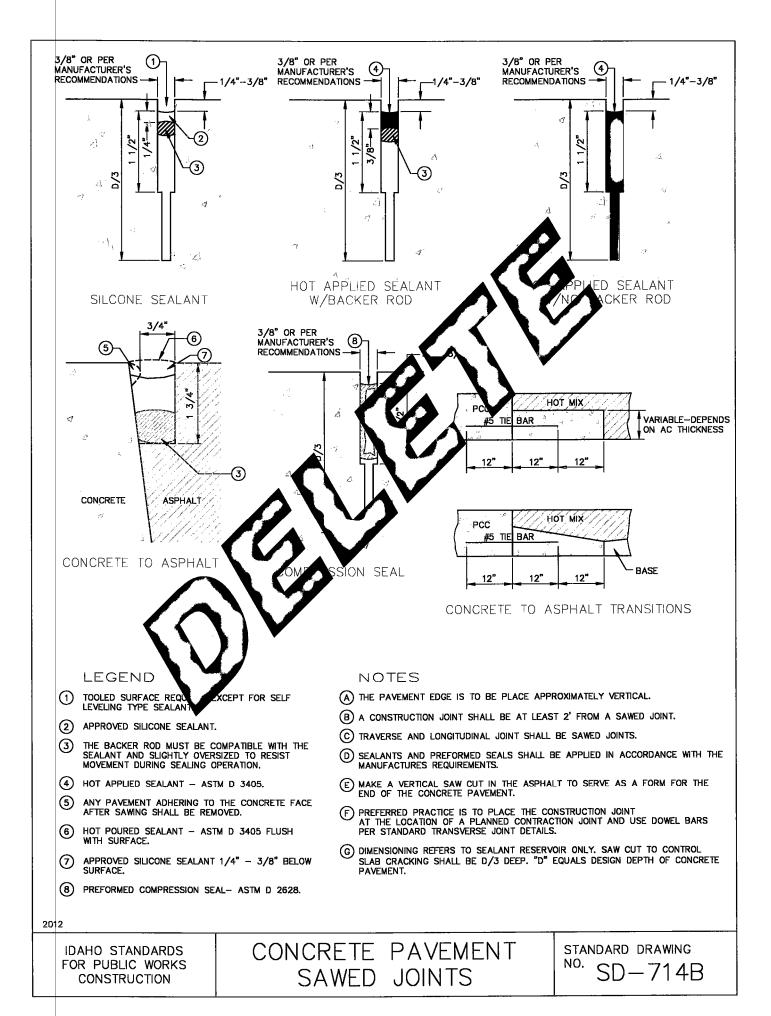
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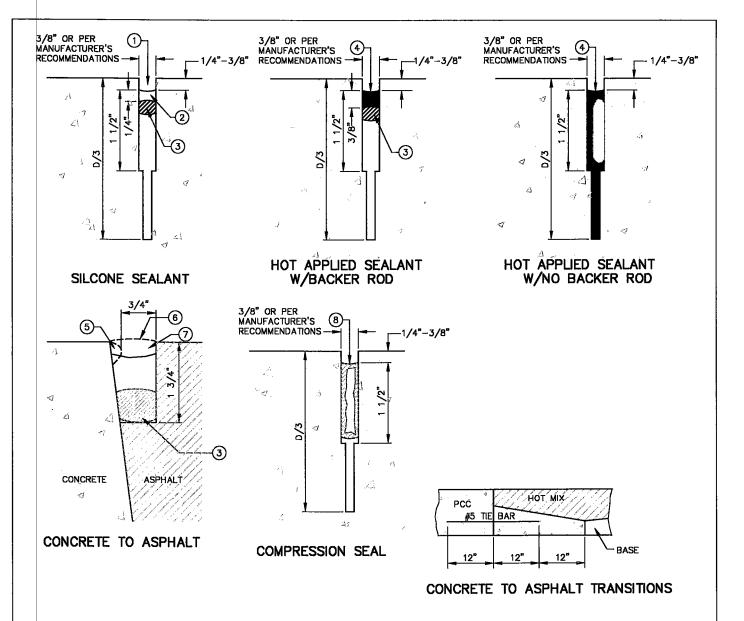
- (A) APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION — 802.
- D APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- (E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION 703.
- F SIDEWALK WIDTH MAY VARY.
- © ROUTING OF SIDEWALK AROUND APPROACH IS NOT NECESSARY WHEN THE PLANTING STRIP EQUALS OR EXCEEDS 6 FEET.
- (H) IF APPROACH SERVES ONE SINGLE FAMILY RESIDENTIAL UNIT, SIDEWALK MAY BE 5"-THICK.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CONCRETE DRIVEWAY WITH DETACHED SIDEWALK

standard drawing NO. SD-710C





LEGEND

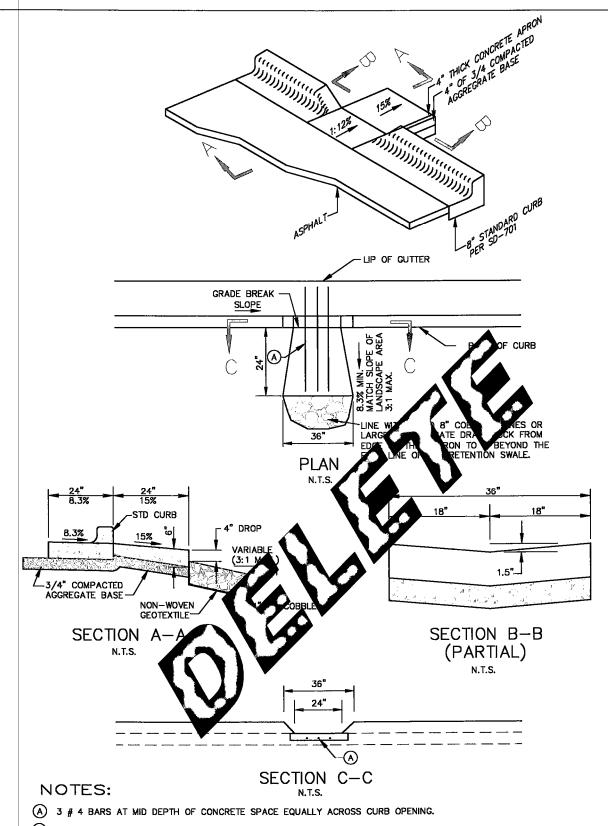
- TOOLED SURFACE REQUIRED EXCEPT FOR SELF LEVELING TYPE SEALANT.
- 2 APPROVED SILICONE SEALANT.
- 3 THE BACKER ROD MUST BE COMPATIBLE WITH THE SEALANT AND SLIGHTLY OVERSIZED TO RESIST MOVEMENT DURING SEALING OPERATION.
- (4) HOT APPLIED SEALANT ASTM D 3405.
- (5) ANY PAVEMENT ADHERING TO THE CONCRETE FACE AFTER SAWING SHALL BE REMOVED.
- 6 HOT POURED SEALANT ASTM D 3405 FLUSH WITH SURFACE.
- APPROVED SILICONE SEALANT 1/4" 3/8" BELOW SURFACE.
- (8) PREFORMED COMPRESSION SEAL— ASTM D 2628.

NOTES

- (A) THE PAVEMENT EDGE IS TO BE PLACE APPROXIMATELY VERTICAL.
- (B) A CONSTRUCTION JOINT SHALL BE AT LEAST 2' FROM A SAWED JOINT.
- (C) TRAVERSE AND LONGITUDINAL JOINT SHALL BE SAWED JOINTS.
- (D) SEALANTS AND PREFORMED SEALS SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURES REQUIREMENTS.
- $\stackrel{\textstyle \leftarrow}{\mathbb{E}}$ make a vertical saw cut in the asphalt to serve as a form for the end of the concrete pavement.
- F PREFERRED PRACTICE IS TO PLACE THE CONSTRUCTION JOINT AT THE LOCATION OF A PLANNED CONTRACTION JOINT AND USE DOWEL BARS PER STANDARD TRANSVERSE JOINT DETAILS.
- G DIMENSIONING REFERS TO SEALANT RESERVOIR ONLY. SAW CUT TO CONTROL SLAB CRACKING SHALL BE D/3 DEEP. "D" EQUALS DESIGN DEPTH OF CONCRETE PAVEMENT.

2012 ACHD REVISION

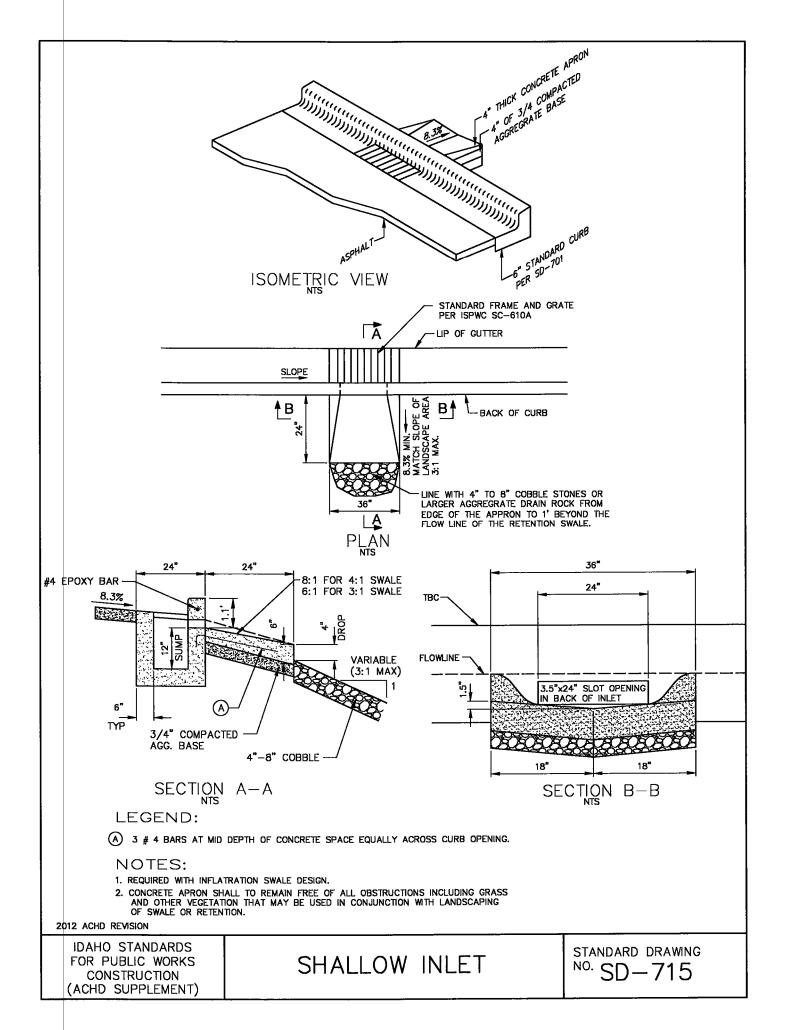
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) CONCRETE PAVEMENT SAWED JOINTS

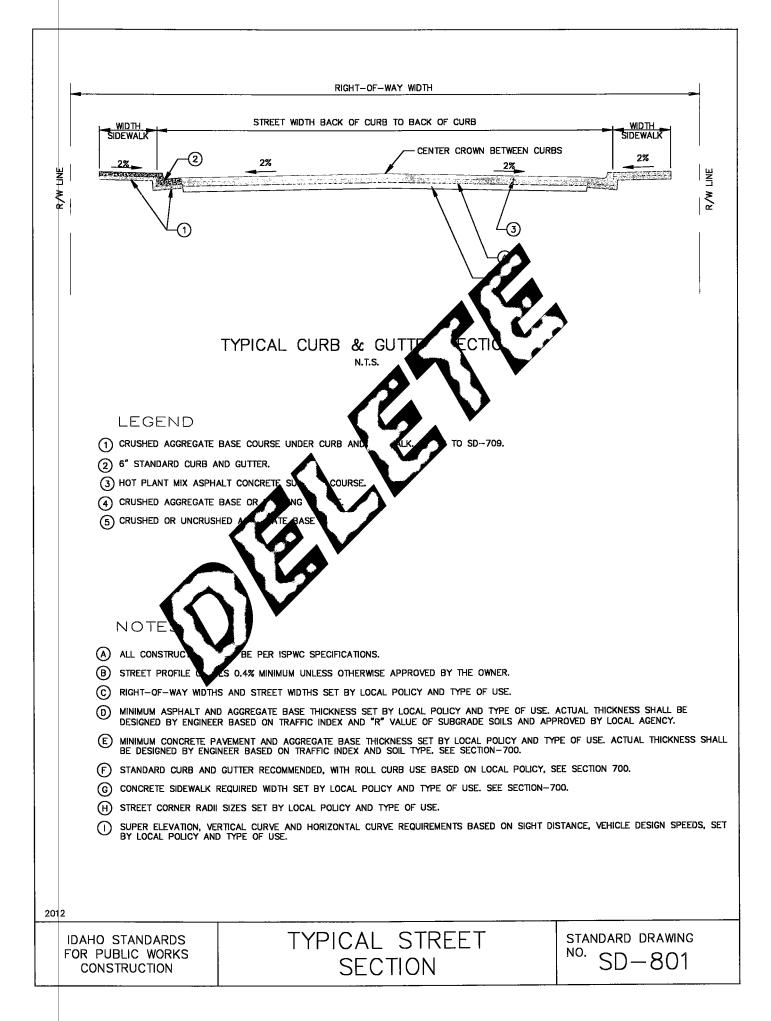


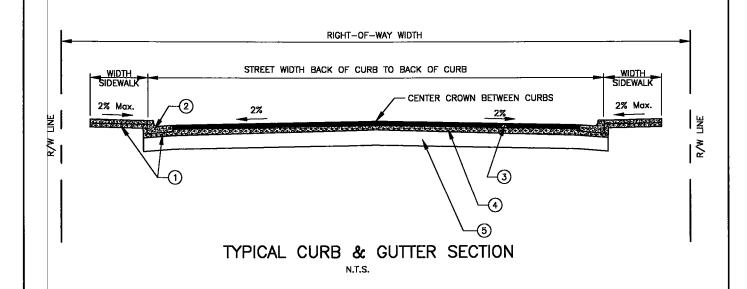
- B REQUIRED WITH INFLITRATION SWALE DESIGN.
- C CONCRETE APRON SHALL REMAIN FREE OF ALL OBSTRUCTIONS INCLUDING GRASS AND OTHER VEGETATION THAT MAY BE USED IN CONJUNCTION WITH LANDSCAPING OF SWALE OR RETENTION BASIN.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION CURB DRAIN







LEGEND

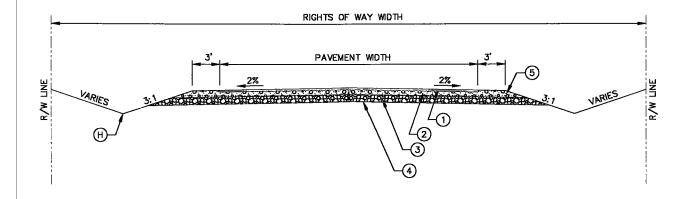
- (1) CRUSHED AGGREGATE BASE COURSE UNDER CURB AND SIDEWALK. REFER TO SD-709.
- (2) 6" STANDARD CURB AND GUTTER.
- (3) HOT PLANT MIX ASPHALT CONCRETE SURFACE COURSE.
- (4) CRUSHED AGGREGATE BASE OR LEVELING COURSE.
- (5) CRUSHED OR UNCRUSHED AGGREGATE BASE COURSE.

NOTES:

- (A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.
- (B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.
- (C) RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.
- (D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION—700.
- (F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION 700.
- (G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.
- (H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.
- U SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) TYPICAL STREET SECTION



TYPICAL RURAL ROA SECTION

N.T.S.

LEGEND

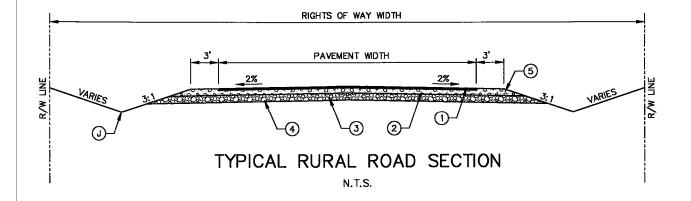
- 1) HOT PLANT MIX ASPHALT CONCRETE SURFACE COL
- (2) CRUSHED AGGREGATE BASE OR LEVELING COURS
- (3) CRUSHED OR UNCRUSHED AGGREGATE BAS URSE.
- (4) SUBGRADE.
- (5) CRUSHED AGGREGATE SHOULDERS.

NOTES:

- A RURAL STREET SECTION SED COLLECTOR, AND RESIDENTIAL TYPE STREETS IN THE AREAS OUTSIDE ESTA NOT AREAS THE USE OF THIS SECTION SUBJECT TO LOCAL POLICY AND RESIDENTIAL TYPE STREETS IN AREAS THE USE OF THIS SECTION SUBJECT TO
- (B) ALL CONSTRUCTIONS.
- (C) STREET POORLE & 0 JUNEAU UNLESS OTHERWISE APPROVED BY THE OWNER.
- (D) RIGHT WIDTHS SET BY LOCAL POLICY AND
- (E) MASPH AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF US. US. WALL WESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" OF BGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- F STREET RADII SIZES FOR EDGE OF PAVEMENT SET BY LOCAL POLICY AND TYPE OF USE.
- G SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.
- (H) BORROW DITCHES SHALL HAVE A MINIMUM 3:1 FORE SLOPE WITH 4:1 SLOPE RECOMMENDED. THE BACK SLOPE OF BORROW DITCH SHALL BE MINIMUM 1:1 BACK SLOPE WITH 4:1 BACK SLOPE RECOMMENDED. THE FLOW LINE OF THE DITCH SHALL BE MINIMUM 6" BELOW THE LOWEST AGGREGATE BASE COURSE TO ENCOURAGE DRAINAGE, PIPING DITCH UNDER DRIVEWAYS REQUIRED WITH APPROVED LENGTH AND TYPE.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION TYPICAL RURAL STREET SECTION



LEGEND

- 1) HOT PLANT MIX ASPHALT CONCRETE SURFACE COURSE.
- 2 CRUSHED AGGREGATE BASE OR LEVELING COURSE.
- (3) CRUSHED OR UNCRUSHED AGGREGATE BASE COURSE.
- (4) SUBGRADE.
- (5) CRUSHED AGGREGATE SHOULDERS.

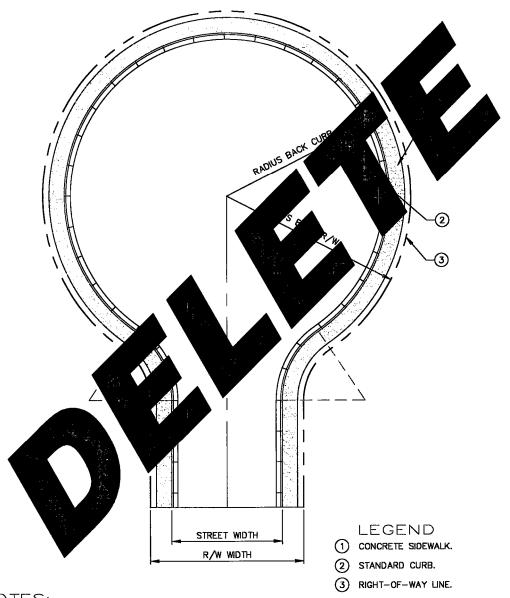
NOTES:

- (A) THE ACHD STANDARD MATERIAL FOR ROADWAY LEVELING COURSE ON TOP OF UNCRUSHED 6 OR 8-inch PITRUN BASES IS TYPE 1 AGGREGATE PER TABLE 1 OF SECTION 801 UNLESS OTHERWISE APPROVED IN WRITING.
- (B) THE ACHD STANDARD MATERIAL FOR GRANULAR ROADWAY BASE IS 6 OR 8-inch PITRUN PER TABLE 1 OF SECTION 802 UNLESS OTHERWISE APPROVED IN WRITING.
- © RURAL STREET SECTION USED FOR ARTERIAL, COLLECTOR, AND RESIDENTIAL TYPE STREETS IN THE AREAS OUTSIDE THE ESTABLISHED URBAN AREAS THE USE OF THIS SECTION SUBJECT TO LOCAL POLICY AND TYPE OF USE.
- (D) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.
- (E) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.
- $\stackrel{\textstyle \leftarrow}{\mathbb{F}}$ RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.
- (G) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- (H) STREET CORNER RADII SIZES FOR EDGE OF PAVEMENT SET BY LOCAL POLICY AND TYPE OF USE.
- SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE
- BORROW DITCHES SHALL HAVE A MAXIMUM 3:1 FORE SLOPE WITH 4:1 SLOPE RECOMMENDED. THE BACK SLOPE OF BORROW DITCH SHALL BE MAXIMUM 1:1 BACK SLOPE WITH 4:1 BACK SLOPE RECOMMENDED. THE FLOW LINE OF THE DITCH SHALL BE MINIMUM 6" BELOW THE LOWEST AGGREGATE BASE COURSE TO ENCOURAGE DRAINAGE. PIPING DITCH UNDER DRIVEWAYS REQUIRED WITH APPROVED LENGTH AND TYPE.

ACHD 2012 Revisions

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) TYPICAL RURAL STREET SECTION

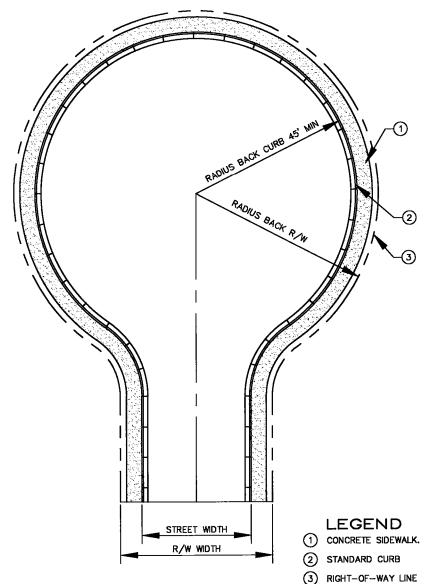
standard drawing NO. SD-802



- (A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECFICATIONS.
- (B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.
- (C) RIGHT-OF-WAY STREET WIDTHS AND DIAMETER SET BY LOCAL POLICY AND TYPE OF USE.
- (D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- (E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.
- (F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION-700.
- (G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.
- (H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.
- UL-DE-SAC RADIUS REQUIRED DETERMINED BY MINIMUM TURNAROUND RADIUS FOR MOTOR VEHICLES. ACTUAL RADIUS SET BY LOCAL POLICY AND TYPE OF USE.
- UL-DE-SAC MAY BE OFFSET TO THE LEFT OR RIGHT SO THAT APPROACH STREET CURB IS TANGENT WITH CUL-DE-SAC CIRCLE.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION STANDARD CUL-DE-SAC

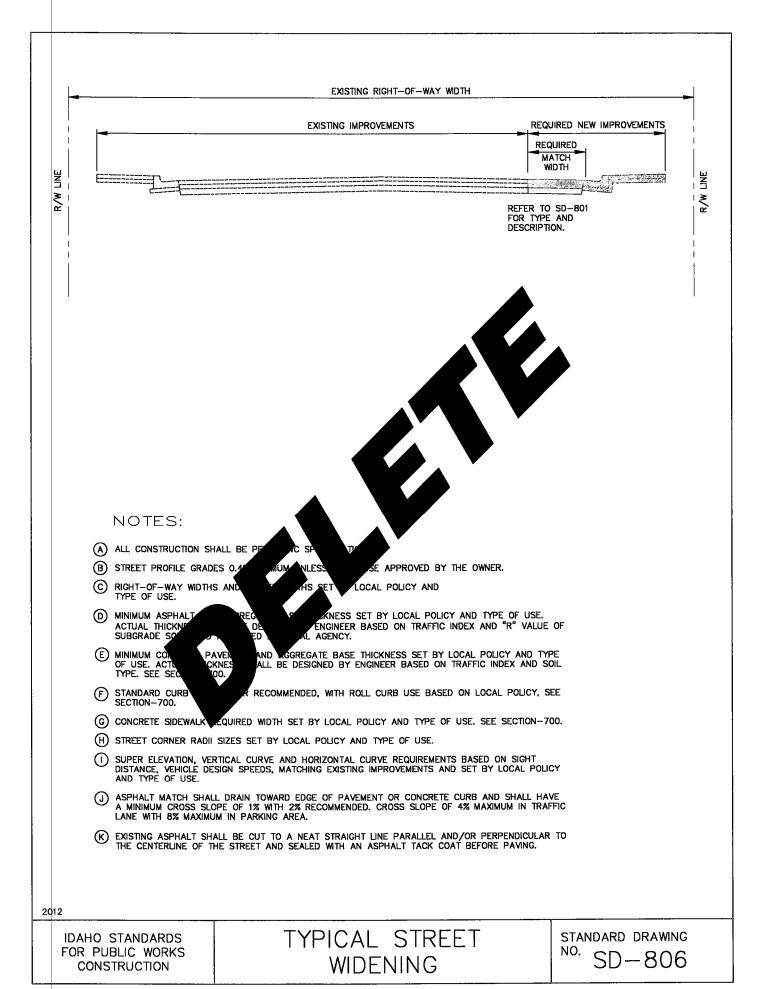


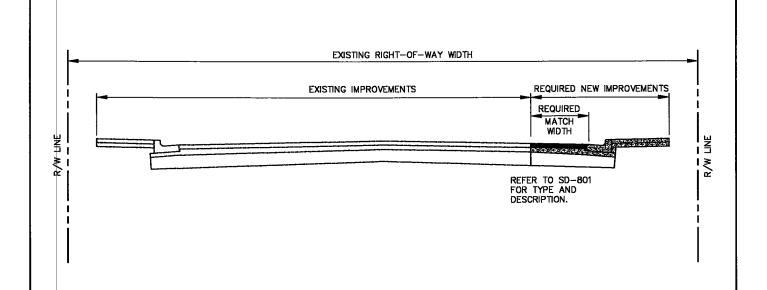
- (A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECFICATIONS.
- (B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.
- C RIGHT-OF-WAY STREET WIDTHS AND DIAMETER SET BY LOCAL POLICY AND TYPE OF USE.
- MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- (E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.
- (F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION-700.
- (G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.
- (H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.
- (1) CUL-DE-SAC RADIUS REQUIRED DETERMINED BY MINIMUM TURNAROUND RADIUS FOR MOTOR VEHICLES. ACTUAL RADIUS SET BY LOCAL POLICY AND TYPE OF USE.
- (J) CUL-DE-SAC MAY BE OFFSET TO THE LEFT OR RIGHT SO THAT APPROACH STREET CURB IS TANGENT WITH CUL-DE-SAC CIRCLE.

ACHD 2012 Revisions

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT)

STANDARD CUL-DE-SAC standard drawing NO. SD-805

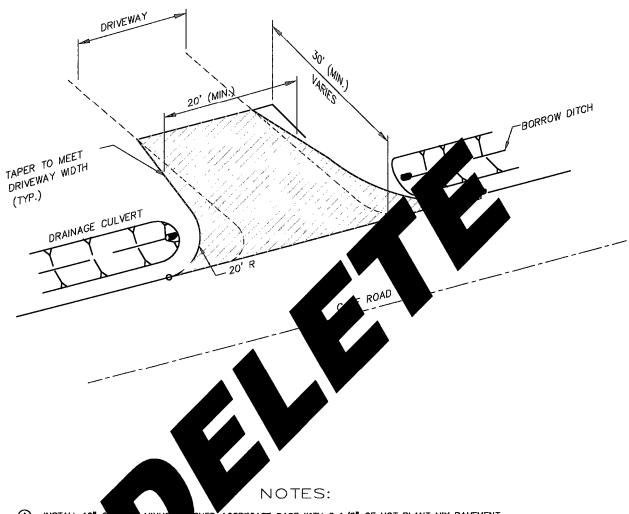




- (A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.
- (B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.
- © RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.
- (D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.
- (E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.
- $\begin{picture}(60,0)\put(0,0){\line(1,0){10}}\end{picture}$ STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION-700.
- (G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.
- (H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.
- USUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, MATCHING EXISTING IMPROVEMENTS AND SET BY LOCAL POLICY AND TYPE OF USE.
- (J) ASPHALT MATCH SHALL DRAIN TOWARD EDGE OF PAVEMENT OR CONCRETE CURB AND SHALL HAVE A MINIMUM CROSS SLOPE OF 1% WITH 2% RECOMMENDED. CROSS SLOPE OF 4% MAXIMUM IN TRAFFIC LANE WITH 8% MAXIMUM IN PARKING AREA.
- (K) EXISTING ASPHALT SHALL BE CUT TO A NEAT STRAIGHT LINE PARALLEL AND/OR PERPENDICULAR TO THE CENTERLINE OF THE STREET AND SEALED WITH AN ASPHALT TACK COAT BEFORE PAVING.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) TYPICAL STREET WIDENING

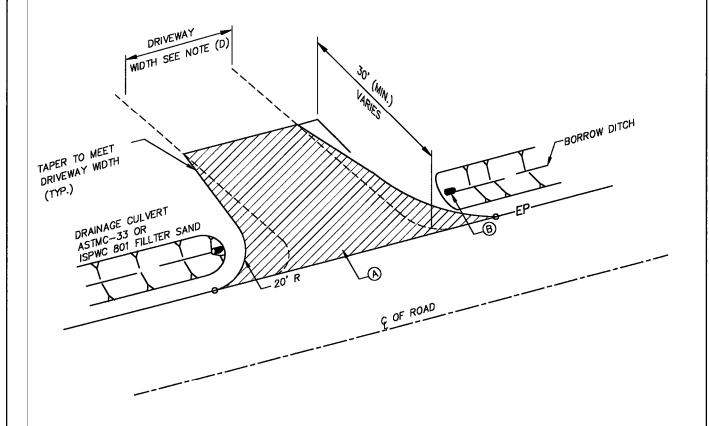


- (A) INSTALL 12" OF HOT PLANT MIX PAVEMENT.
- B INSTALL 12" MINI. PIPE CULVERT TO CONTINUE BORROW DITCH DRAINAGE WHERE APPLICABLE.
- © AMOUNT OF DRIVEW VARIES BASED ON GRADE CHANGE. USE 30' AS A MINIMUM.

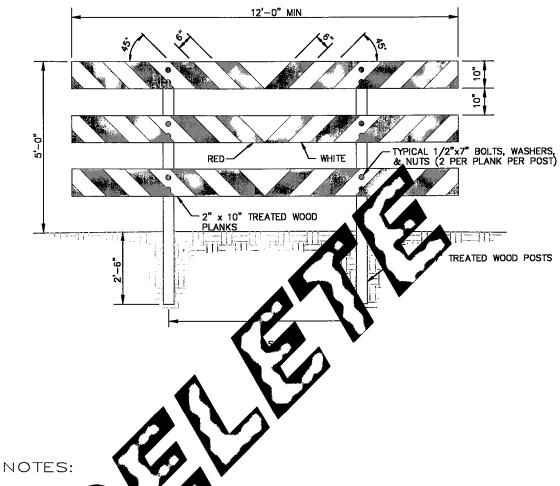
2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION RURAL DRIVEWAY APPROACH

standard drawing NO. SD-809



- (A) INSTALL 12" OF 3/4" MINUS CRUSHED AGGREGATE BASE WITH 2 1/2" OF HOT PLANT MIX PAVEMENT.
- (B) INSTALL 12" MINIMUM DIAMETER PIPE CULVERT TO CONTINUE BORROW DITCH DRAINAGE WHERE APPLICABLE.
- C AMOUNT OF DRIVEWAY REPAIR VARIES BASED ON GRADE CHANGE. USE 30' AS A MINIMUM.
- D DRIVEWAY WIDTH WILL NEED APPROVAL FROM ACHD'S DEVELOPMENT SERVICES

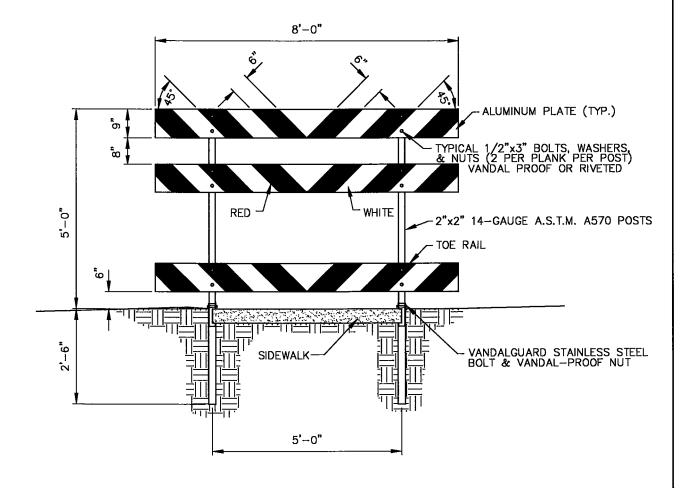


- A THE ABOVE PLANS. ED AND INSTALLED BY THE CONTRACTOR WHERE CALLED FOR ON THE
- AALL BE RED AND WHITE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45° (B) MARKING IN THE
- ENTIRELY ACROSS ROADWAY, IT IS DESIRABLE THAT THE STRIPES SLOPE DOWNWARD TRAFFIC MUST TURN IN DETOURING. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED IPPING MAY SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE. C WHERE BAR IN THE DIRE FOR, THE CH
- (D) THE ENTIRE ARE RED AND WHITE STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS.
- (E) FREE STANDING BARRICADES SHALL BE BUILT SIMILAR, BUT 4"x4" POSTS SHALL BE 5'-0" LONG AND SHALL HAVE 2" x 6" x 4'-0" LONG SUPPORTS SET 90'TO AND CENTERED ON POST FOR SUPPORT AND ATTACHED WITH 2-1/2"x7" BOLTS WITH WASHERS AND NUTS.
- (F) ALL SURFACES SHALL BE PAINTED WITH MINIMUM TWO COATS OF WHITE OIL BASE PAINT. ALL PAINTS SHALL BE REFLECTORIZED.

2012

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

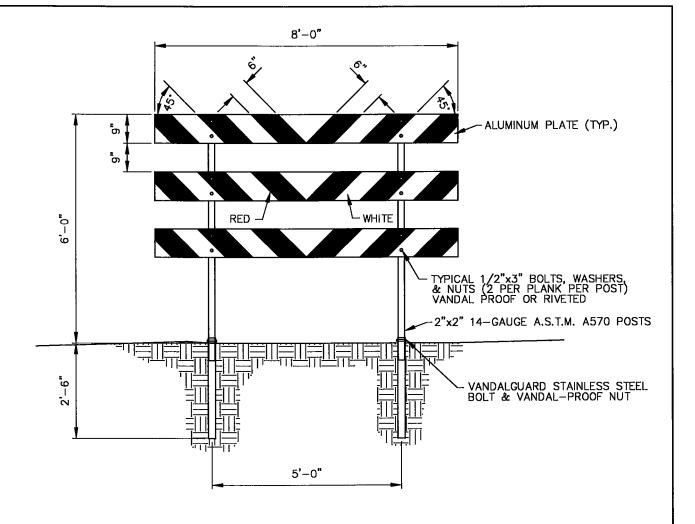
TERMINUS BARRICADE STANDARD DRAWING SD - 1132



- THE ABOVE BARRICADE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHERE CALLED FOR ON THE PLANS.
- (B) MARKINGS FOR BARRICADE RAILS SHALL BE RED AND WHITE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45° IN THE DIRECTION TRAFFIC IS TO PASS).
- WHERE BARRICADE EXTENDS ENTIRELY ACROSS ROADWAY, IT IS DESIRABLE THAT THE STRIPES SLOPE DOWNWARD IN THE DIRECTION WHICH TRAFFIC MUST TURN IN DETOURING. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED FOR, THE CHEVRON STRIPPING MAY SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.
- (D) THE ENTIRE AREA OF RED AND WHITE STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS.
- FREE STANDING BARRICADES SHALL BE BUILT SIMILAR, BUT 2"x2" POSTS SHALL BE 5'-0" LONG AND SHALL HAVE 2" x 6" x 4'-0" LONG SUPPORTS SET 90' TO AND CENTERED ON POST FOR SUPPORT AND ATTACHED WITH (2) 1/2"x7" BOLTS WITH WASHERS AND NUTS.
- (F) ALL SURFACES SHALL BE PAINTED WITH MINIMUM TWO COATS OF WHITE OIL BASE PAINT. ALL PAINTS SHALL BE REFLECTORIZED.

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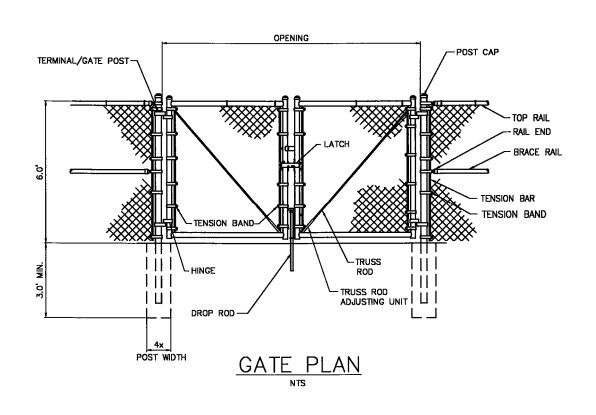
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) TERMINUS BARRICADE TYPE II

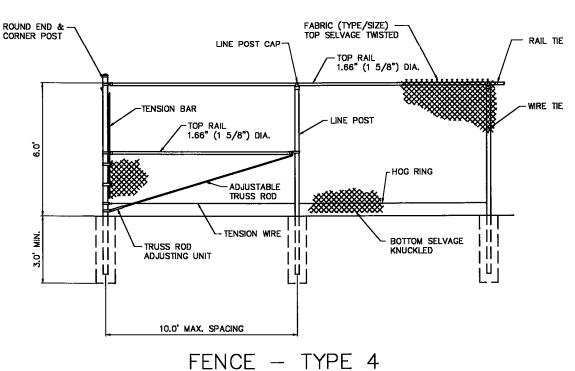


- THE ABOVE BARRICADE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHERE CALLED FOR ON THE PLANS.
- (B) MARKINGS FOR BARRICADE RAILS SHALL BE RED AND WHITE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45° IN THE DIRECTION TRAFFIC IS TO PASS).
- © WHERE BARRICADE EXTENDS ENTIRELY ACROSS ROADWAY, IT IS DESIRABLE THAT THE STRIPES SLOPE DOWNWARD IN THE DIRECTION WHICH TRAFFIC MUST TURN IN DETOURING. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED FOR, THE CHEVRON STRIPPING MAY SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.
- (D) THE ENTIRE AREA OF RED AND WHITE STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS.
- FREE STANDING BARRICADES SHALL BE BUILT SIMILAR, BUT 2"x2" POSTS SHALL BE 6'-0" LONG AND SHALL HAVE 2" x 6" x 4'-0" LONG SUPPORTS SET 90' TO AND CENTERED ON POST FOR SUPPORT AND ATTACHED WITH (2) 1/2"x7" BOLTS WITH WASHERS AND NUTS.
- (F) ALL SURFACES SHALL BE PAINTED WITH MINIMUM TWO COATS OF WHITE OIL BASE PAINT. ALL PAINTS SHALL BE REFLECTORIZED.

2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) TERMINUS BARRICADE TYPE III





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2012 ACHD REVISION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ACHD SUPPLEMENT) STANDARD FENCE - TYPE 4 CHAIN-LINK FENCE

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1130.01 — GENERAL REQUIREMENTS

(Revised 04/22/2010)

A. Description

These Supplemental Provisions shall supplement the ACHD approved sections of the latest adopted version of the Idaho Standards for Public Works Construction (ISPWC).

The following General Conditions shall apply to all Sections of these Supplemental Provisions, unless otherwise specified herein.

B. Abbreviations

Unless the context otherwise requires, wherever in these Supplemental Provisions the following abbreviations, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided below.

AASHTO American Association of State Highway and Transportation Officials

AC Alternating Current

ACHD Ada County Highway District
ADA Americans with Disabilities Act

ANSI American National Standards Institute
ASTM American Society for Testing and Materials
ATSSA American Traffic Safety Services Association

AWG American Wire Gage

AWPA American Wood Preservers Association

EPS Emergency Preemption System

IMSA International Municipal Signal Association
ISPWC Idaho Standards for Public Works Construction

ITD Idaho Transportation Department
ITE Institute of Transportation Engineers

LED Light Emitting Diode

MSDS Material Safety Data Sheets

MUTCD Manual on Uniform Traffic Control Devices

NEC National Electrical Code

NEMA National Electrical Manufacturers Association

OTDR Optical Time Domain Reflectometer

REA Rural Electrification Administration (REA has been annexed by the RUS)

RPC Rigid Plastic Conduit
RUS Rural Utilities Service

TMC ACHD Traffic Management Center

Working titles having a masculine gender, such as "workman" and the pronoun "he", are utilized in these Supplemental Provisions for the sake of brevity, and are intended to refer to persons of either gender.

C. Definitions

The following definitions pertain only to these Supplemental Provisions.

Actuation – The operation of any type of detector.

Business Days – Consecutive days during which the ACHD Administration Building is open for business. The ACHD Administration Building is open for business Monday through Friday with the exception of ACHD approved holidays.

Call-Back Lights – A supplemental outdoor 120 volt incandescent light that indicates to an emergency response vehicle that the Opticom device has received the signal that provides a green light, and therefore intersection right-of-way, to the responding vehicle.

Channel – A discrete information path.

Channelizers – Channelizers are flexible reflectorized devices installed within the roadway to discourage motorists from crossing a line or area of the roadway. Channelizers are intended to provide additional guidance and/or restriction to traffic by supplementing pavement markings, traffic stripes and delineators. Channelizers may be used for the following:

- Warn and alert drivers of hazards in the traveled way.
- Guide and direct traffic (Channelizers may be used in place of delineators, when required within a paved area).
- Additional emphasis to discourage illegal median crossings at traffic islands.

Closed Circuit Television Camera (CCTV) – A camera used to monitor traffic flow.

Confirmation Lights - See Call-Back lights.

Controller Assembly— The complete assembly for controlling the operation of a traffic signal or other system, consisting of a controller unit, and all auxiliary equipment housed in a weather proof cabinet.

Controller Unit – That part of the controller assembly which performs the basic timing and logic functions.

Crosswalk Markings – Crosswalk markings serve primarily to guide or channelize pedestrians into the proper path. Crosswalk markings are solid white lines, 12 inches wide, marking both edges of the crosswalk. A marked crosswalk has a minimum of 6 feet clear width between the lines.

Detector – A device for indicating the passage or presence of vehicles or pedestrians.

Delineators – Delineators are reflective devices mounted at the side of the roadway, in series, to indicate the roadway alignment. They are normally placed in the ground outside of the edge of pavement. (Note: Where delineators are required within a paved area, surface mounted channelizers may be used.)

Electrolier – The complete assembly of lighting standard, luminaire, ballast and lamp.

Emergency Preemption Detector – A detector capable of being actuated by an emergency service vehicle (fire, police, ambulance, etc.) When this detector is activated, the controller will either hold or advance to the preempted phase.

Flasher – A device used to open and close signal circuits at a repetitive rate.

Flashing Beacon Control Assembly – A complete electrical mechanism for operating a warning beacon or intersection control beacon.

Flashing Mode – This feature, when enabled, discontinues normal signal operation and causes the flashing of any predetermined combination of signal lights.

Indicator Lights - See Call-Back lights.

Inductive Loop Vehicle Detector – A detector capable of being actuated by the change of inductance caused by a vehicle passing over or remaining stationary over the loop.

Lane Numbering – On a multilane roadway, the traffic lanes available for through traffic traveling in the same direction are numbered from left to right when facing the direction of traffic flow.

LED – Light emitting diode.

Luminaire – The assembly which houses the light source and controls the light emitted from the light source.

Luminaire Arm – The structural member, bracket, or mast arm, which is mounted on a standard and supports the luminaire.

Pavement Markings – Pavement markings are defined as transverse markings which include, but are not limited to, word and symbol markings, limit lines (stop bars), crosswalk markings, parking stall markings, and at grade rail crossing markings.

Pedestrian Detector – A detector, usually of the push button type, capable of being actuated by hand.

Private Street – A private street is a roadway that is not publicly owned or maintained by ACHD or the Idaho Transportation Department..

Public Street – A public street is a roadway that is built in the public right-of-way.

Radar Detection – A radar detector is activated when a vehicle crosses the digital radar field.

Signal Face – That part of a signal head provided for controlling traffic in a single direction and consisting of one or more signal sections.

Signal Head – An assembly containing one or more signal faces.

Signal Indication – The illumination of a signal section or other device, or of a combination of sections or other devices at the same time.

Signal Section – A complete unit for providing a signal indication consisting of a housing, lens, reflector, lamp receptacle and lamp.

Standard – The shaft or pole used to support street lighting luminaires, traffic signal heads, mast arms, etc.

Stop Bars (Limit Lines) – Stop bars (or limit lines) are solid white lines, 24 inches wide, extending across all approach lanes to indicate the point behind which vehicles are required to stop.

Traffic Phase – The right of way, change and clearance intervals assigned to a traffic movement or combination of movements.

Traffic Stripes (Lane Lines) – Traffic stripes (lane lines) are defined as longitudinal center lines and lane lines which separate traffic lanes in the same or opposing direction of travel, and longitudinal edge lines which mark the edge of traveled way.

Video Detection – A video detector is activated when a vehicle enters a predetermined detector zone as seen through the lens of a camera.

D. Headings and Bold Face Type

Headings to sections, parts, forms, articles, sub-articles and bold face type within these Supplemental Provisions are inserted for convenience and/or reference only. They shall not affect the interpretation of these Supplemental Provisions.

E. Contact Information

The ACHD Traffic Operations Supervisor, Signal Inspector, Signal Construction Crew Chief, Sign Crew Chief and Electronic Technician can be contacted at the following location:

ACHD Traffic Operations 3700 Adams St. Garden City, ID 83714 Tel: (208) 387-6190

The ACHD Traffic Engineering Supervisor, Traffic Design Engineer, and Congestion Management Supervisor can be contacted at the following location:

ACHD Traffic Engineering 3775 Adams Street Garden City, ID 83714 Tel: (208) 387-6140 Digline can be contacted at (800) 342-1585.

The Idaho Department of Revenue and Taxation can be reached at (208) 334-7691.

1130.02 — CONTROL OF WORK

(Revised 06/03/05)

A. Errors and Omissions

If the Contractor, in the course of work, becomes aware of any errors or omissions, either in the contract documents or in the layout as given by survey points and instructions, or becomes aware of any discrepancy between the contract documents and the physical conditions of the work site, then the Contractor shall immediately inform ACHD in writing. The ACHD Traffic Engineer shall rectify the matter and advise the Contractor accordingly. Any work done after such discovery, without the approval of the ACHD Traffic Engineer, will be done at the Contractor's risk.

B. Inspection

ACHD reserves the right to inspect the manufacturing process of all materials. Final inspection and acceptance of the installed materials will not be given until final installation and testing has been completed on the systems. Approval to install materials and equipment must be obtained from ACHD.

Any inspection and associated testing is for the sole benefit of the ACHD and shall not relieve the Contractor of the responsibility of providing quality control measures to assure the work complies with the contract requirements and these Supplemental Provisions.

C. Supplemental Provisions Cost Included in Contract Price

All costs incurred by reason of, or in connection with, these Supplemental Provisions shall be included in the contract bid price(s).

D. Shop Drawings

All shop drawing submittals shall comply with the latest adopted version of the Idaho Standards for Public Work Construction (ISPWC).

Approval of shop drawings does not constitute final acceptance or guarantee of the equipment, but is solely to assist the Contractor in providing the specified materials.

Preparation of shop drawings shall be considered incidental to other items in the contract and no further compensation shall be made therefore.

All shop drawings that require the approval of the ACHD Traffic Engineer or the ACHD Congestion Management Supervisor will be subject to a minimum of a ten business day review period.

1130.03 — CONTROL OF MATERIALS

(Revised 06/03/05)

A. Warranties, Guarantees and Instruction Sheets

Manufacturers' warranties, guarantees, instruction sheets, and parts lists that are furnished with the materials incorporated in the project shall be delivered to ACHD prior to acceptance of the project.

B. Storage of Materials

Materials to be incorporated in the project shall be stored in such a manner as to ensure the preservation of their quality and fitness for the project, and to facilitate inspection.

C. Certificates of Compliance

The Contractor shall supply Certificates of Compliance to ACHD for all manufactured items furnished by the Contractor, at the discretion of the ACHD Traffic Engineer. This includes, but is not limited to, all wire, conduit, junction boxes, control equipment, striping materials and sign materials. The Contractor shall not install any such item until ACHD has approved its Certificate of Compliance. In addition, ACHD may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of these Supplemental Provisions and the contract documents. A Certificate of Compliance shall be furnished with each lot of material delivered to the work site. Each certified lot shall be clearly identified in the certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and these Supplemental Provisions. Any material not conforming to the requirements set forth in the plans and these Supplemental Provisions will be subject to rejection whether in place or not.

ACHD reserves the right to refuse the use of material on the basis of a Certificate of Compliance when inspection or other evidence indicates the material does not in fact comply with the contract requirements or these Supplemental Provisions.

D. ACHD Furnished Materials

ACHD will make available to the Contractor all materials which are listed in the contract documents as supplied by ACHD. The Contractor shall be responsible for coordinating pick up of ACHD furnished materials in a timely manner. Contractor shall coordinate with the appropriate ACHD personnel as described in these Supplemental Provisions. ACHD furnished materials shall be provided at ACHD's Traffic Operations facility and shall be hauled to the construction site by the Contractor. Contractor will also be responsible for any costs associated with handling, loading and unloading of material supplied by ACHD.

The items shown in these Supplemental Provisions as "supplied by ACHD" or "Typically Supplied by ACHD" are items generally supplied by ACHD. However, ACHD will only provide the items shown in the project Special Provisions as "supplied by ACHD", unless otherwise directed by the ACHD Traffic Engineer.

E. Use Tax

The Contractor will be required to pay use tax for all items furnished by ACHD. The use tax is based on the value of the materials supplied to the Contractor by ACHD. The ACHD Traffic Design Engineer shall make every effort to list the costs of all items to be supplied by ACHD in the bid documents. If any items supplied by ACHD are not listed in the bid documents, then the Contractor shall contact the ACHD Traffic Operations Supervisor to obtain those costs.

The Contractor is advised to consult Section 63-3609, of the <u>Idaho Code</u>, and Rule 12 (Contractors Improving Real Property) of the Idaho Department of Revenue and Taxation. The Contractor can contact the Idaho Department of Revenue and Taxation for guidance.

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1131.01 — GENERAL REQUIREMENTS

(Revised 1/19/2012)

A. Description of Work

The work to be performed shall consist of the installation of a complete and operable traffic signal, illumination for intersection safety lighting and related electrical systems. All work performed shall conform to the latest **National Electrical Code (NEC)** and all applicable state and local regulations and these supplemental provisions.

The Contractor shall install all electrical conduit, wiring, traffic signal and pedestrian poles, vehicle and pedestrian signal heads, pedestrian push buttons, luminaires, Opticom detectors, video detection cameras, junction boxes, traffic signs mounted on the signal poles or mast arms, and other incidental materials as required to comply with the plans and these Supplemental Provisions. All materials necessary for the complete installation shall be furnished by the Contractor with the exception of materials specifically noted to be furnished by Ada County Highway District (ACHD) or other agencies. Contractor shall contact the ACHD Traffic Operations Supervisor a minimum of 30 calendar days in advance to schedule pick up of items supplied by ACHD. Contractor shall verify pick up time, date and location a minimum of two business days in advance of pick up.

The materials to be incorporated in the installation of traffic signals and intersection safety lighting shall be listed in the bid package. All materials and methods required under this section, unless otherwise superseded herein, shall conform to the current Manual on Uniform Traffic Control Devices (MUTCD) and to the ATSSA Quality Standards for Work Zone Traffic Control Devices.

B. Restrictions on the Scope of Work

1. Mast Arm Erection Timing

Mast arms shall not be erected more than ten days prior to energizing the signal system.

2. Signal Head Installation and Covering

All vehicle and pedestrian heads shall be securely and completely covered with opaque material between installation and signal turn on. Signal head covers shall be made of heavy, waterproof material and shall be securable by braided nylon rope. Contractor shall monitor the signal heads to ensure that the covers are securely and completely covering the signal heads while the signal is not in operation.

3. Work in Roadway

The roadway shall be kept open to traffic at all times, except when specific tasks that require construction in the roadway or lane closures are approved by ACHD. All roadway trench crossings shall be conducted at night between 7:00 p.m. and 6:00 a.m., unless otherwise approved by the ACHD Traffic Engineer. All other work within the traveled way of any roadway shall be limited to the hours between 9:00 a.m. and 4:00 p.m., unless

otherwise directed by ACHD. At least one lane in each direction shall remain open to traffic on every leg of all intersections during working hours, except for mast arm erection. Exceptions will require a two business day advanced approval from the ACHD Traffic Engineer.

4. Traffic Control during Construction

During the erection of mast arm assemblies, the Contractor, with the authorization of the ACHD Traffic Engineer, may block all traffic lanes for a maximum of five minutes between 9:00 a.m. and 2:00 p.m. on any day of the week.

Construction activities that require lane closures longer than five minutes will require a detailed traffic control plan that has been approved by ACHD. Contractor shall not begin such activities until after receiving written approval from ACHD.

The Contractor shall furnish flaggers for traffic control during all roadway work performed at night, for all roadway work performed within 150 feet of an intersection, and for all other conditions where the ACHD Traffic Engineer deems it necessary for safety and traffic operation. All flaggers shall be certified by ATSSA, or other ACHD approved association. All flagging certifications shall be current. Payment for the flaggers shall be made as set forth in the contract.

5. New Traffic Signal Turn-on

Signal turn-on to full operation shall not be allowed on Mondays, Fridays, weekends or holidays and shall be completed between the hours of 9:00 AM and 3:00 PM on the day of the turn-on. No turn-on will be allowed until all of the traffic stripes, pavement markings and signs, shown on the Plans and/or specified in these Supplemental Provisions, are installed.

The Contractor shall not turn the signal system, or any of its parts that are visible to motorists, on or off. Only an ACHD Electronic Technician is permitted to turn a signal on or off. The Contractor shall provide for the proper control of traffic during the turn-on procedure as directed by ACHD.

The ACHD Traffic Operations Engineer shall be responsible for entering all signal timing parameters, and shall certify that the intersection is operating and functioning in accordance with the Plans and these Supplemental Provisions. Before the controller is connected and the traffic signal made operational, the Contractor shall perform all field tests as specified in these Supplemental Provisions. The Contractor shall be present during the turn-on with adequate equipment and personnel to repair any deficiencies in the signal operation.

The ACHD Traffic Operations Engineer shall be notified a minimum of five business days in advance of the desired turn-on date. No turn-on will be allowed until the ACHD Electronic Technician has completely checked the installation (independent of the Contractor's tests) and approved turn-on.

6. Inspection of Work

The Contractor shall complete and document all work in a manner that provides the ACHD Resident Project Representative or the ACHD Traffic Engineer with full knowledge of the construction. Work shall proceed in accordance with the approved construction schedule supplied at the preconstruction meeting, and as approved by ACHD. The ACHD Resident Project Representative, ACHD Traffic Engineer or ACHD Inspector may, at their option, require work completed without their knowledge or inspection to be dismantled, at the Contractor's expense, so that it can be inspected for conformance to the specifications.

Any inspection and associated testing is for the sole benefit of the ACHD and shall not relieve the Contractor of the responsibility of providing quality control measures to assure the work complies with the contract requirements.

7. Permits

The Contractor shall be responsible for coordinating, obtaining, and paying for all permits necessary to complete all work in a timely fashion.

C. Operational Field Testing

Any item furnished by ACHD and installed by the Contractor, which fails due to no fault of the Contractor, will be corrected by ACHD at no expense to the Contractor.

D. Removal and Salvage

All existing equipment, signs, traffic signal devices, street lighting and other materials designated by ACHD to be removed and salvaged shall remain the property of ACHD. These items shall be delivered by the Contractor immediately upon their removal to an ACHD facility as designated on the Plans or as directed by the ACHD Signal Inspector. Any material damaged or destroyed due to Contractor's negligence shall be replaced by the Contractor at his expense.

E. Removal of Unwanted Material

The Contractor shall be responsible for removal and disposal of all other unwanted material created by the required removal of items shown on the Plans or specified herein. Unless otherwise directed by the ACHD Traffic Operations Engineer or shown on the Plans, all foundations and junction boxes not to be reused shall be removed entirely. The conduits connecting to the foundation shall either be cut off and capped or removed, as directed by ACHD.

When a foundation is to be abandoned, the top of the foundation, anchor bolts, and conduits shall be removed to a depth not less than six inches below the surface of sidewalk or unimproved ground. The resulting hole shall be backfilled with material equivalent to the surrounding material.

F. Bonding and Grounding

Bonding and grounding shall conform to the latest edition of the **National Electrical Code (NEC)** and all applicable State and local regulations and these supplemental provisions.

1131.03 – Video Detection System

(Revised 12/28/2011)

A. Description

The intent of the following specification is to describe the minimum requirements for providing a complete Video Detection System. Initially, the system shall be capable of providing presence vehicle detection at selected intersections. The video system shall be expandable without removing or replacing existing units.

Acceptable systems include that of any manufacturer whose system has successfully passed a 60 day ACHD field test, provided such equipment meets qualifying specifications identified herein, and whose video module is compatible with ACHD's traffic signal central software, Naztec, atms.now.

The purpose of the Video Image Processor is to detect the presence of vehicles over optical detection zones, which are placed on a standard video image (CCIR or EIA). Using standard image sensor optics and in the absence of occlusion, the system shall be able to detect vehicle presence with 98% accuracy under normal conditions (days and nights), and 96% accuracy under adverse conditions (fog, rain, snow).

All items and materials furnished shall be new, unused, current production models installed and operational in a user environment and shall be items currently in distribution. The detection algorithms shall have a proven record of field use at other installations for at least three (3) years of service i.e., not including prototype field trials prior to installation. Video cameras shall be available commercially, no sole source cameras will be allowed.

These technical specifications describe the minimum physical and functional properties of a video detection system. The system shall be capable of monitoring all licensed vehicles on the roadway, providing video detection for areas outlined in the construction drawings.

B. Materials

The entire video vehicle detection system shall consist of the following:

Video image processing unit(s) – rack mountable
ViewCom – Remote Monitoring, Video Image Storage and Communication card.
Video Camera(s) with IR Filter, Lens, Enclosure, and Sunshield.
Luminaire Arm or Signal Mast Arm Sensor Bracket(s).
Surge Suppressor.
Programming Devices and/or Software. Coax/Power Cable
All Other Necessary Equipment for Operation.
Training for Installation, Operation, and Maintenance.

The following equipment package has been pre-approved for use by ACHD:

Traficon VIP3.1/D and/or VIP3.2/D. and/or VIP3.1/Ds and/or VIP3.2/Ds. Traficon 2 CH. I/Os – 4 Ch. I/Os.

Traficon ViewCom/E-MAX.

Naxtec by Traficon - VU Com

Aigis Outdoor Camera Housing - HS9384.

Aigis Camera Housing Sunshield – HS9384SS.

FLIR thermal camera (as required by ACHD)

Rainbow Camera Model CL54ZD65K (standard video detection camera)

Sony 1/3" Super HAD II Color CCD 6.5-65mm 10x zoom lens.

Rainbow LCD 8" Flat Screen Monitor-RL8.

Pelco Extended Mast Arm Camera Mount - AB-0172-L-L.

Kar-Gor, Inc., Universal Camera Mount –MA/SOP-16.

Hesco/RLS Coaxial Surge Suppressor - HE75CX

Coaxial + 5 Conductor Wire - RG59/U + STR PE/PVC 600V KG-9915.

Video Detection System

The Video Image Processor (VIP) shall be modular by design and housed in either a self-contained standalone unit or fit directly into NEMA TS2 type racks as well as Type 2070 input files. The VIP shall be interchangeable between a shelf or rack mount installation without replacing or modifying existing VIP units.

The system shall control from 1 to 4 VIP boards allowing for 1 to 8 image sensors.

The system shall be designed to operate reliably in the adverse environment of roadside cabinets and shall meet or exceed all NEMA TS2, as well as Type 2070 environmental specifications.

Ambient operating temperature shall be from –34 to +74 degrees Centigrade at 0 to 95% relative humidity non-condensing.

The system shall be powered by 12-40 VDC and draw less than 2 amperes.

The system shall utilize cabinet 24 VDC for rack mount installations or external 24 VDC for stand-alone shelf installations.

Surge ratings shall be set forth in the NEMA TS2 specifications.

Serial communications shall be through an RS232 serial port. This port can be used for communications into a modem or laptop to upload/download detector configurations, count data and software upgrades. RS485 on the rear edge connector shall facilitate communications to other VIP boards.

Each VIP board shall have 4 opto-isolated open collector outputs. Twenty (20) additional outputs shall be available via the expansion port. The VIP/3D shall have 20 presence detection zones and 4 data detection zones per camera. Data zones shall collect and store vehicle counts, volume, speed, gap time, headway, occupancy, and classification. Data shall be time-stamped (6713 intervals) and stored onboard (non-volatile memory) in intervals from 1-60 minutes.

Data alarms are generated for: queue, inverse direction, speed drop, no video, and errors.

Must be able to provide single or double loop emulation.

Presence hold time must have parameters that range from 10 to 600 seconds.

Each VIP board shall allow for 20 digital inputs via the I/O Expansion port.

Each VIP board shall have error detection. Outputs will be turned "ON" if the video signal is bad or the VIP board is not functioning properly. A user defined quality level will automatically put selected outputs to recall in cases of severe degraded visibility (i.e., fog, blizzard, etc.). Normal detection resumes when visibility improves above the user defined quality level.

Operator selectable recall shall be available via the VIP front panel. Holding the recall switch on for 5 seconds shall activate this function.

A video select button on the VIP front panel will switch between camera images of the VIP3D.2.

The VIP3D.1 board shall have 1 video input; the VIP3D.2 board shall have 2 video inputs (RS-170 NTSC or CCIR composite video) and one video out.

The VIP board shall have a reset button on the front panel to reset video detectors to "learn" the roadway image. During "relearn", selectable recall can be enabled or disabled for immediate operation. Learning time of video detectors shall be less than 6 minutes.

External surge suppression, independent of the VIP board shall separate the VIP from the image sensor.

The VIP board shall have separate light emitting diodes (LEDs) that indicate:

POWER Red Led to verify power supply.

I/O COMM Red Led to indicate communications to expansion boards.

VIDEO 1 & 2 Red Led to verify the presence of video input 75 Ohm.

TX & RX Red Led to indicate communications to other VIP modules via the RS485.

OUT1- OUT4 Green LED if the corresponding detection group is active.

The VIP board shall also have 2 separate buttons for:

VIDEO SELECT - RECALL

RECALL Manually places call on detectors.

RESET Manually reset detectors to "learn" new background.

VIDEO OUT The VIP board shall also have a video out female RCA style connector.

SERVICE B9 female Service port and DB9 I/O Expansion port.

The VIP Expansion board shall also have separate LEDs that indicate:

POWER Red LED to verify power supply.

COMM Red LED to indicate communications to VIP board.

I/O1- I/O4 Green LED if the corresponding detection group is active.

The VIP Expansion board shall have 8 dip switches that define inputs And outputs used (range: 1-12 or 13-24).

Event Log Database

The VIP module shall have an onboard database capable of time stamping and storing 500 events. The Event Log Database can be viewed or downloaded to a selected spread sheet. Erasure of the Event Log Database shall not alter programmed configurations. As a minimum, the VIP shall log and time stamp the following events;

Firmware upgrade.
Loss of video signal.
Resumption o f video signal.
Configuration change.
Bad video quality.
Loss of power to VIP module.
Resumption of power to VIP module.
Speed alarm.
Inverse direction.
Recall activated.

C. Functional Capabilities

Real Time Detection

Each VIP board shall be capable of processing the video signal of one or two cameras. The video signal shall be analyzed in real time (30 times per second for NTSC video format and 25 frames per second for pal video format).

The system shall be expandable up to 8 cameras that may be connected to different VIP units and programmed independently.

The system shall be capable of displaying detectors on the video image with associated outputs. Outputs/Inputs status will be indicated on the screen. Parameters will also include the ability to view raw video without any verbiage and/or detectors for surveillance purposes.

Each VIP board will detect within the view of the connected camera the presence of vehicles in user defined zones. Detectors available shall be presence, count, delay, extension, or pulse mode for either arrival or departure of vehicles. Delay and extension shall be defined between 0.1-99.9 seconds and pulse mode between 0-200msin 33ms increments if NTSC is used. Each VIP board shall also detect and collect within the view of the connected camera traffic data of passing vehicles in user-defined zones.

Collected traffic data by direction shall include:

Volume (absolute numbers) per length class and per lane. Average speed (mph) per length class and per lane. Average gap time (1/10 sec) per length class and per lane. Average headway (m or feet) per lane. Occupancy (%) per lane Concentration (vehicles/mile) per lane. Average length (feet) per lane. Confidence level (0-10) per lane.

The VIP board shall be programmed without the use of a supervisor computer. A standard CCTV monitor and keypad plugged into the VIP serial port will facilitate detector programming.

The VIP board shall store up to 4 detector configurations. It shall be possible to switch between detector configurations manually, automatically by time of day or remote input.

Via the serial port, detector configurations can be uploaded to a laptop and stored on disk.

Detectors may be linked to 24 outputs and 20 inputs using Boolean Logic features: AND, OR, NOT. It will be possible to generate conditional outputs based upon inputs from a controller.

It shall be possible to make a detector directional sensitive. Options will include an omni-directional detector or a detector that only senses movement: from right to left, left to right, up to down or down to up as you look at the monitor.

All detectors and parameters can be changed without interrupting detection.

For example: when one detector is modified all existing detectors continue to operate, including the one that is being modified. When the new position is confirmed, the new detector will enter a learning phase. Once the new detector is in function it will take over the job of the old one. In this way, the detector is always fully operational with no interruption on any detector, even during modification. Learning phases for new detectors shall not exceed 6 minutes.

Four data detection zones per camera on a two camera VIP board may be used for collection of vehicle count, speed, classification, occupancy, density, headway, and gap time.

Eight data detection zones may be used on a single camera VIP board.

These detectors will detect and store traffic data at user-defined intervals of 1, 2, 3, 5, 6, 10, 15, 30 & 60 minutes. It shall be possible for each VIP board to store up to 6713 intervals of data in non-volatile memory.

Associated software may be used with a PC to download data and export to a spreadsheet. Software will also be used to upload and download detector configurations, traffic data, technical events, send software versions upgrades and do remote setup of detectors.

The VIP board shall have an internal clock with daylight saving time system, which can be enabled or disabled.

The VIP board shall provide overlaid tool tips for each individual menu- and submenu-items.

The VIP board shall have an optional password implementation. Different user-levels shall be available each having different rights.

A minimum of 10 users can be defined for each user-level.

The VIP board shall be able to delay or extend a detector zone output in combination with an input from the controller.

The VIP board shall detect wrong-way drivers and shall provide an alarm/event via communication board and/or output.

The VIP board shall provide an alarm and/or output when the user selected queue detection threshold of occupancy is exceeded for more than a user selected time threshold.

The VIP board shall distinguish five classes of detected vehicles based upon user selectable vehicle length thresholds.

The VIP shall be able to emulate loop emulation with user selectable loop dimensions.

Video System Communication Module (Viewcom/E-MAX)

By establishing communication between the PC management software on the central computer and the Video Image Processor (VIP) detectors, the Viewcom/E-MAX board performs all primary functions for communication and transmission of traffic data and alarm events issued by the VIP detectors. The Viewcom/E-MAX also provides MPEG-4 compressed streaming video for remote monitoring.

Key Features:

Transmission of data, alarm events, images, generated by VIP detector boards.

MPEG-4 streaming video.

Remote monitoring of VIP boards. Up to 4 cameras from the VIP 3.1/D and 8 cameras from the VIP3.2/D modules.

Password secured, remote configuration.

TCP/IP based 10/100 Mbps Ethernet.

A standard internet browser connects to the Viewcom/E-MAX to monitor and set- up the video detection installation.

Easy set-up and user friendly.

Direct plug-in for Type 170, 2070 MEMA TS1 & TS2 detector racks.

High mean time between failures (MTBF), field-proven performance.

Specifications:

Dimensions

NEMA and 2070 compatible card rack unit.

Communication

Ethernet communication for image-data and streaming video transfer (10/100 Mbps RJ-45 connector.

RS-232 serial communication port for local service access and set-up with keypad.

RS-485 communication within a rack for data acquisition via edge connector.

Inputs

Composite video 75 Ohm at 1 Volt peak to peak, CCIR/EIA.

Power supply.

Reset button on front panel.

Outputs

Analog video output with overlay of system information. Power LED indicator.

Connector

Double row 22 pins EDGE (NEMA TS 2-2003).

Power Supply Consumption

10.8 volts to 26.5 volts DC. 170 mA @ 24 volts DC.

Environmental

-30 degrees F to +165 degrees F (-34C to +74 C). 0 to 95% relative humidity — non condensing.

D. Image Sensor - Camera

The unit shall be a high resolution, 1/3" color image format CCD camera, designed for professional video surveillance systems. Incorporating the latest in CCD technology, the video camera shall provide detailed video without lag, image retention, or geometric distortion.

Temperature range -20 to +50 degrees C

Humidity 5% to 95% relative, non-condensing

Dimensions 47mm X 47mm X 83mm

Weight 7.1 oz.

Camera mounting slots 1/4-20, top and bottom Connectors BNC for video out

Lens mount CS

Power-in / pressure screw Lens / 4-square connector

Finish Off-white semi-gloss polyurethane

Construction All metal housing

Rated input voltage 12VDC or 24VAC +/-10% @60Hz

Nominal power 4 Watts

Imager Interline transfer CCD 1/3" format Imager spectral response 100% @ 550nm:

30% @ 400nm and 800nm

Sync system EIA RS-170
Active picture elements 768 H X 494 V
Horizontal resolution 580 TVL

Sensitivity (3200 K)

	Usab	le Picture	Full Video
Scene Illumination	fc	0.01	0.048
	lx	0.12	0.48
Imager Illumination	fc	0.0024	0.010
	Lx	0.024	0.10
* F1.2 lens @ 89% highlight			

Signal to noise ratio 48 dB minimum AGC 21 dB, (max)

Electronic Shutter 1/60 to 1/600000 sec. (EIA)

Aperture Correction Horizontal and vertical symmetrical

Video out 1.0 volts peak-to-peak +/- 0.1 volt @ 75 Ohms Programmable Controls Video level, shutter, AGC, BLC, Auto Black

E. Image Sensor - Lens

The camera lens shall be a motorized vari-focal 6.5-65mm with auto iris.

Image format 1/3 inch

Focal length 10X zoom (6.5-65mm)

Iris range f 1.4 – Approx. 360 (With ND Spot Filter)

Back focus distance 9.85mm (in air)

Weight 285g

Size 104.3mm X 70mm X 60mm

Lens mount CS

Iris control DC 4-pin square
Focus control Motorized
Zoom Motorized

F. Image Sensor - Housing

The environmental housing shall be an aluminum enclosure designed for outdoor CCD camera installations.

Temperature range -40 to +122 degrees F Dimensions 18.4" x 4" x 4.4"

Weight 5.6 lbs.

Housing mounting Three 1/4-20 tapped holes
Camera mounting Removable cradle assembly

Cable entry Three liquid-tight fittings that will accept cable diameters of:

One fitting - 2 to 7 mm
Two fittings - 3 to 10 mm

Finish Light gray semi-gloss polyurethane Construction Extruded aluminum housing,

Aluminum rear-end cap,

Aluminum front cap with glass face plate, and aluminum cradle

A sunshield shall be included

Window 3 mm thick glass that includes a

Thermostatically-controlled window Heater/defogger strip

Rated input voltage
 Voltage range
 Output voltage
 115 VAC, 50/60 Hertz
 108 VAC to 132 VAC
 24 VAC, 50/60 Hertz

Nominal power
 Enclosure protection
 Waterproof and dust-tight, IP68

Designed to meet NEMA-6P

G. Surge Protection

A video surge suppressor(s) shall be available for installation inside the traffic signal controller cabinet. The suppressor shall provide coaxial cable connection points to an Hesco Model KE75CXR or approved equal transient suppresser for each image sensor.

Peak Surge Current (8 x 20 us) 20 KA

Technology Hybrid, Solid State
Attenuation 0.1db @ 10Mhz
Response Time <1 nanosecond
Protection Line to Ground

Shield to Ground (isolated shield modules)

Clamp Voltage 6 volts
Connectors BNC
Impedance 75 Ohms

Temperature -40 to +85 degrees C Humidity 0-95% non-condensing

Dimensions 3" x 1" x 1" UL Listed UL 497B

H. Image Sensor – Mounting Brackets

Mast arm installations shall be mounted at a sufficient height to prevent occlusion from cross traffic between the stop bar and the mast arm on which the camera is installed. A six- (6) ft. maximum length of internally reinforced tube shall be attached to the mast arm bracket for camera mounting above the mast arm. Camera shall be mounted to the top of the tube with the camera manufacturers recommended bracket. Camera bracket shall provide adjustments for both vertical and horizontal positioning for the camera. Camera attachments shall be designed to securely fasten the camera to prevent the extension tube from falling into the path of vehicles and/or becoming loose. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.

Luminaire arm installations shall be installed on the luminaire arm, with the camera/video manufacturers recommended brackets. Camera luminaire brackets shall provide adjustments for both vertical and horizontal positioning of the camera. Camera attachments shall be designed to securely

fasten the camera to the luminaire arm. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.

IMAGE SENSOR- CABLE (COAXIAL & POWER)

Power/video cable from the signal controller cabinet to the video camera shall be a continuous **Kar-Gor composite cable 75 ohm RG59/U with 18awg, 5 conductors, Part Number KG-9915P**, or ACHD approved equivalent.

Power/video cable shall be continuous from the controller cabinet to the video camera. No splicing of power/video cable will be allowed

Coaxial & Power cable (Siamese) shall be installed in conduits or overhead as indicated in the plans. Coaxial cable shall be suitable for exterior use and in direct sunlight. Power cable will have a minimum of 5 conductors.

Coaxial cable will be terminated in the surge suppressor before being connected directly to VIP boards.

Power cable will be terminated into a fuse panel provided by the manufacturer and connected to 120 VAC in the controller cabinet.

Description of cable: Composite, 6 Conductors 2 elements: 18awg 5 conductors 7/26 bare copper, .016" polyethylene, 20awg 1 conductor, solid bare copper, 056" foam polyethylene jacket black, overall .030" PVC jacket black.

FI FMFNT 1	FLEMENT 2

CONDUCTORS/PAIR COUNT:	5 CONDUCTORS	1 CONDUCTOR
GUAGE & STRANDING:	18AWG 7/26 BC	20AWG SOLID BC
PRIMARY INSULATION TYPE:	POLYETHYLENE	FOAM PE
INSULATION THICKNESS:	.016"	.056"
COLOR CODE:	WHITE, RED, BLUE, BLACK, BROWN.	NATURAL
SHEILD:	N/A	N/A
TAPE:	N/A	N/A
DRAIN WIRE:	N/A	N/A
BRAID:	N/A	95% BC
CAPACITANCE:	N/A	N/A
PRINT LEGEND:	N/A	N/A
JACKET TYPE:	N/A	POLYETHYLENE
JACKET COLOR:	N/A	BLACK
JACKET THICKNESS:	N/A	.035"
NOMIMAL OD:	N/A	.242"

OVERALL ASSEMBLY OF WIRE

JACKET THICKNESS: .030"

JACKET COLOR: BLACK

JACKET MATERIAL: PVC RIPCORD: YES .512" **NOMINAL OD: VOLTAGE RATING:** 600V TEMP. RATING: 75C **UL TYPE OR STYLE:** N/A **PRINT LEGEND: TBD** PACKAGING: **TBA**

COPPER WEIGHT: 39.87 LBS/MFT SHIPPING WEIGHT: 100 LBS/MFT

J. Video Monitor

The black and white video monitor will need to be sized to fit in the existing ACHD controller cabinets. The maximum size of the TFT LCD monitor shall be 8" and shall meet the following requirements:

Electrical

System: 8" TFT LCD Monitor Resolution: 800 x 600, 380 TV Lines

Contrast Ratio: 500:1

Lamp Lifetime: 20,000 hours

Viewing Angle: (L/R)(U/D) 70Deg

Display Mode: Video 1, Video 2, S-Video

OSD Menu: Language, Contrast, Brightness, Color, Shaprness, Tint, Reset

Inputs: 2 x BNC, 1x S-Video, 2x Audio

Outputs: 2x BNC, 1x Audio

Power Requirement: 100~240V AC, 50/60 Hz, 1.5A Power Consumption: 18w (12VDC on rear of unit)

Environmental

Operating Temperature: 32° F to 104°F (0° C to 55°C)

General

Dimensions: $7.5 \times 6.8 \times 1.0$ in. (w/h/d)

Weight: Approx. 2.4lbs
Auto power off when no signal detected

K. Installation and Training

The ACHD Signal Inspector shall supervise the installation of the video equipment. An ACHD Signal Technician will install, make fully operational, and test the system as indicated on the intersection drawings and this specification.

Two days training shall be provided to personnel of the contracting agency in the operation, setup, and maintenance of the video detection system. Instruction and materials shall be produced for a maximum

of 10 persons and shall be conducted at a location selected by the contracting agency. The contracting agency shall be responsible for travel, room and board expenses for its own personnel.

L. Warranty

The video detection system shall be warranted against manufacturing defects in materials and workmanship for a period of two years from date of installation or thirty months from date of shipment, whichever comes first. The video detection supplier shall provide all documentation necessary to maintain and operate the system.

M. Addendums

The following functions are added to the VIP3.x and VIP3D.x Video Detection Modules when upgrading to version 3.38 firmware;

- 1. Camera Movement Suppression
- 2. Tree Shadow Suppression
- 3. Startup Recall Timeout
- 4. Detection Hold Time
- 5. Wrong Way Sensitivity
- 6. Wrong Way Suppression Delay

1131.04 - RADAR ADVANCE TRAFFIC SIGNAL DETECTION

(Revised 12/12/11)

A. General Information

This Item shall govern the purchase and installation of above ground Radar Advance Detection Devices (RADD) equivalent to the Wavetronix SmartSensor Advance™ Model 200. Test results and other documentation demonstrating RADD performance and capabilities shall be provided.

The Radar Advance Detection Device shall be non-intrusive and equivalent to the Wavetronix SmartSensor Advance™ Model 200. The RADD shall be easy to install; it shall be remotely accessible; it shall provide multiple connectivity options for easy integration into legacy systems; it shall be manufactured to the strictest industry standards; and it shall utilize automated assembly processes to ensure product quality and minimize the risk of failure due to error.

B. Auto-Calibration

The RADD shall have a method for automatically calibrating the detection device; this mehod will be executed in the RADD's internal processor. This auto-calibration method shall automatically determine detection thresholds.

C. Sensor Performance

The RADD shall accurately and continuously detect ETA (Estimated Time of Arrival), speed, and range data for vehicles, or clusters of vehicles simultaneously moving within 100 feet to 500 feet from the sensor in the selected direction of travel. The RADD shall be mounted in a forward-fire position, looking into either approaching or departing traffic for the selected direction of travel. The RADD shall filter the ETA data, speed data, and range data based upon minimum and maximum constraints to produce alerts customizable for safe and efficient dilemma zone protection, congestion management, and other operational goals.

The RADD shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light. The device shall not rely on temperature compensation circuitry and shall be capable of continuous operation over an ambient temperature range from -40° C to 75° C, and a relative humidity range from five percent to 95 percent (non-condensing). RADD operation shall continue in rain or snow up to 10 cm per hour, and the device shall not experience degraded performance when encased in ½" of ice.

Speed data shall be accurate for individual vehicle measurements when there are no adjacent vehicles traveling in the same direction. Eighty-five percent of all measurements shall be within five mph of truth when vehicles are not changing speed. Speed accuracy shall be verified with radar gun, or by video speed trap using the frame rate as a time reference.

Range data shall be accurate for individual vehicle measurements when there are no adjacent vehicles traveling in the same direction. Eighty-five percent of all measurements shall be within ten feet of the distributed length of the vehicle when vehicles are not changing speed. Range

accuracy shall be verified with: LIDAR gun, or by video using visual markers as a distance reference and frame rate as a time reference.

ETA data shall be accurate for individual vehicle measurements when there are no adjacent vehicles traveling in the same direction. ETA is the estimated time of arrival as calculated by dividing the vehicles range from the stop bar by the speed of the vehicle. ETA is calculated for purposes of safely and efficiently protecting vehicles within the decision dilemma zone, which is nominally defined to exist for motorists with an ETA between 2.5 and 5.5 seconds from the stop bar who are driving faster than 35 mph when the light turns yellow. Eight-five percent of all measurements shall be within one second of truth for all vehicles not changing speed within the decision dilemma zone. ETA accuracy shall be verified with LIDAR gun or by video using visual markers as a distance reference and frame rate as a time reference.

D. Mounting and Installation

To achieve the specified accuracy and reliability, the RADD shall be installed according to the following conditions:

- Two RADD units shall not be mounted so that they are pointed directly at each other unless separated by more than 400 feet; and a RADD shall not be placed within 20' of another RADD unless each device is configured to operate on a different RF channel using the installation software.
- 2. Mounting Assembly The RADD shall be mounted directly onto a mounting assembly fastened to a pole, overhead mast-arm or other solid structure. The mounting assembly shall provide the necessary degrees of rotation to ensure proper installation. It shall be constructed of weather resistant materials and shall be able to support a 20 lb. load.
- 3. Cabling The RADD shall be supplied with a connector cable of the appropriate length for each installation site. The connector shall meet the MIL-C-26482 specification; the backshell shall be an environmentally sealed shell that offers excellent immersion capability, and designed to interface with the appropriate MIL-C-26482 connector; all conductors that interface with the connector shall be encased in a single jacket, and the outer diameter of this jacket shall be within the backshell's cable O.D. range to ensure proper sealing; the backshell shall have a clamp bar style strain relief with enough strength to support the cable slack under extreme weather conditions. Recommended connectors are Cannon's KPT series, and recommended backshells are Glenair Series 37 cable sealing backshells. The MIL-C-26482 connector shall provide contacts for all data and power connection.

If communication is conducted over the RS-485 bus, the communication cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Shielded, twisted pairs with a drain wire
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/ ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000 ft

- Single continuous run with no splices allowed
- Terminated only on the two farthest ends of the cable
- The operational baud rate and cable length shall not exceed the following limits:

Baud Rate*	Cable Length
115.2Kbps	300 feet
57.6Kbps	600 feet
38.4Kbps	800 feet
19.2Kbps	1000 feet
9.6Kbps	2000 feet

^{*}Note: These represent maximum data rates. The data rate used should be the minimum data rate required for operation.

If communication is conducted over the RS-232 bus, the communication cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Shielded, twisted pairs with a drain wire
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/Ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000Ft
- Single continuous run with no splices allowed
- The RS-232 Driver must be able to source and sink +/- 7mA or more
- The operational baud rate and cable length shall not exceed the following limits:

Baud Rate* Cable Leng	
115.2Kbps	40 feet
57.6Kbps	60 feet
38.4Kbps	100 feet
19.2Kbps	140 feet
9.6Kbps	200 feet

^{*}Note: These represent maximum data rates. The data rate used should be the minimum data rate required for operation.

If 12VDC is being supplied for the RADD, the power cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Two shielded, twisted pairs with two drain wires connected in parallel
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/Ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000Ft
- The cable length shall not exceed 100 feet

If 24VDC is being supplied for the RADD, the power cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Two shielded, twisted pairs with two drain wires connected in parallel
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/Ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000Ft
- The cable length shall not exceed 600 feet

If a cable length of 600 feet to 2000 feet is required, the power cable shall be an ANIXTER 2A-1002 or equivalent cable that meets the following requirements:

- 10 AWG Conductor Size/Gauge
- Two Conductor count
- Stranded Cable Type
- Bare Copper material
- 600 Volt range
- 90° Centigrade Temperature rating
- PVC/Nylon Insulation material
- PVC Polyvinyl chloride jacketing material
- 40 Amps per conductor

Both communication and power conductors may be bundled together in the same cable as long as the above-mentioned conditions are met.

- 4. Lightning Surge Protection Lightning surge protection that meets or exceeds the EN 61000-4-5 Class 4 specifications shall be installed no farther than 40 feet along the RADD cable from the RADD unit. To ensure the continued operation of the RADD in the presence of electrical surges, all connections to the RADD shall be protected, including power, RS-232, RS-485 communication lines and ground. The lightning surge protection unit shall be the Wavetronix Click! 200™ or equivalent.
- 5. **Power Supply** The AC to DC power converter supplying the DC voltage for the RADD shall be the Wavetronix Click! 201 or equivalent, providing the following:

Power Rated	>15 W @25°C / >10 W@74°C minimum per RADD unit
Operating Temperature	From –34°C to +74°C
Range	
Operating Humidity Range	From 5% to 95% @25°C non-condensing
Input Voltage	From 85 V (AC) to 264 V (AC) or 120 V (DC) to 370 V (DC)
Input Frequency	From 47 Hz to 63 Hz
Output Voltage	24 VDC ±4%
Hold Up Time	>20 ms at 120 V (AC)
Withstand Voltage	Input to Output: 2 kV, Input to Ground: 1.5 kV
Safety Standards	UL 60950, EN60950
EMC Standards	EN55022 Class B and EN61000-3-2, 3
Brown-Out Protection	In brown-out conditions (i.e. <85VAC input) the output
	voltage shall be less than 1 VDC

E. Communication

The RADD shall provide two or more communication ports that can be accessed simultaneously using any RADD-supported protocol. This will enable multiple operators to collect data from the RADD at the same time without interrupting or interfering with each other. The RADD shall provide RS-232 and RS-485 serial communication ports; each communication port shall support all of the following baud rates: 9600, 19200, 38400, 57600 and 115200. Additionally, the RS-232 port shall be full-duplex and shall support true RTS/CTS hardware handshaking for interfacing to various communication devices. A Wavetronix Click 301 (Serial to Ethernet) shall be used in all ACHD cabinets that are tied into the ACHD fiber communications network.

F. Power Requirements

The RADD shall consume less than 10 watts with a DC input between 12 VDC and 28 VDC. The equipment shall be designed such that the failures of the equipment shall not cause the failure of any other unit of equipment. Automatic recovery from power failure shall be within 15 seconds after resumption of power.

G. Windows® and PocketPC®-based Software

The RADD shall also include graphical user interface software that displays all configured zones and provides visual representation of all detected vehicle clusters. The detected range, speed, arrival time, and identification number shall be viewable on the visual representation of all detected vehicle clusters. The graphical interface shall operate on Windows 98, Windows 2000, Windows NT 4.0, Windows XP Pro and Windows PocketPCs equivalent to the Dell Axim X50v. The software shall automatically select the correct baud rate.

The graphical user interface shall also display all configured alerts and provide visual representation of their actuation. The operator shall have the ability to configure alerts using minimum and maximum constraints on the detected ETA, speed, and range of vehicles.

The operator shall have the ability to save the configuration information to a file, or reload the RADD configuration from a file, using the graphical user interface software. Using the

installation software, the operator shall be able to easily change the baud rate on the sensor by selecting baud rates from a drop-down list, as well as add response delays for the communication ports. Additionally, the operator shall have the ability to switch between data pushing and data polling, and change the RADD's settings for Flow Control from none to RTS/CTS and vice versa.

The operator shall be able to upload new firmware into the RADD's non-volatile memory over any supported communication channel.

H. RF Design

All microwave circuitry within the RADD shall be designed utilizing active control that dynamically adjusts to compensate for temperature and age variations in component performance. This eliminates most opportunities for human error or age degradation in circuits that contribute to product performance. The circuitry shall be void of any manual tuning elements that could lead to human error and degraded performance over time.

All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 ppm stable over the specified temperature range, and ages less than six ppm per year. Any up-conversion of a digitally generated modulated signal shall preserve the phase stability and frequency stability inherent in the digitally generated signal. These specifications ensure that during operation the RADD strictly conforms to FCC requirements and that the radar signal quality is maintained for precise algorithmic quality.

The RADD antennae shall be designed on printed circuit boards, eliminating the need for RF connectors and cabling that result in decreased reliability. Printed circuit antennae are less prone to physical damage due to their extremely low mass.

The antennae parameters shall meet the following criterion to ensure quality performance:

- 1) 3 dB Elevation Beam Width: > 65 degrees
- 2) 3 dB Azimuth Beam Width: < 15 degrees
- Side Lobes: < -20 dB

I. Enclosure

The RADD shall be enclosed in a Lexan polycarbonate, ultraviolet resistant material and shall be classified as watertight according to the NEMA 250 Standard. The enclosure shall be classified "f1" outdoor weatherability in accordance with UL 746C.

The RADD shall be able to withstand a drop of up to 5 feet without compromising its functional and structural integrity.

J. Input File Cards

The RADD manufacturer shall provide an optional input file card compatible with 170, 2070, NEMA TS1 and NEMA TS2 input file racks. The input file card shall translate per vehicle data packets or real-time true presence packets from the RADD into corresponding contact closure outputs. Operators shall be able to assign any contact closure output channel to any configured alert. These settings shall be saved in non-volatile memory on the input file card for complete recovery in case of power failure.

The input file card shall support Dual Loop (Speed Trap) emulation, as well as the following modes of operation:

- Actuation (true presence filtered by conditional alert constraints output in real time with 2.5 ms resolution)
- Pulse (a single 125 ms output pulse for each vehicle)
- Presence (an output pulse corresponding to the duration of each vehicle cluster in the detection zone with a resolution of 2.5 ms)
- Single Loop Speed (duration of the pulse corresponds directly to the speed of the vehicle, speed (mph) = 13.64/duration in seconds)

The input file card shall receive data packets over an RS-485 bus at any of the following baud rates: 9600, 19200, 38400, 57600 and 115200. Also, the input file card shall auto-baud and auto-detect a RADD over wired and wireless communication channels that have a maximum latency of 500 ms.

The input file card shall comply with the NEMA TS2-1998 Traffic Controller Assemblies with NTCIP Requirements, Section 2.8 specification. Documentation and results of the NEMA TS2-1998 test shall be provided.

The input file card shall also provide failsafe operation, so that in the event of failure of communication from the sensor, a constant call shall be placed on all contact closure channels.

Additionally, the input file card shall comply with the EN 61000-4-5 Class 4 lightning surge protection test specification. Documentation and results of the EN 61000-4-5 Class 4 test shall be provided.

K. Manufacturing Requirements

The RADD shall be manufactured and assembled in the U.S.A. The internal electronics of the RADD shall utilize automation for surface mount and wave solder assembly, and shall comply with the requirements set forth in IPC-A-610C Class 3, Acceptability of Electronic Assemblies.

The RADD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include:

- Functionality testing of all internal subassemblies
- Unit level burn-in testing of duration 48 hours or greater

• Final unit functionality testing prior to shipment

Test results and all associated data for the above testing shall be provided, for each purchased RADD by serial number, upon request. Additionally, manufacturing quality data shall be maintained for each purchased RADD by serial number and shall also be made available upon request.

Externally, the RADD shall be modular in design to facilitate easy replacement in the field. The total weight of the RADD shall not exceed five lbs.

All external parts shall be made of corrosion resistant material, and all materials shall be protected from fungus growth and moisture deterioration.

L. FCC

Each RADD shall be Federal Communications Commission (FCC) certified under CFR 47, Part 15, section 15.245 as a field disturbance sensor, or section 15.249 as an intentional radiator. This certification shall be displayed on an external label on each device according to the rules set out by the FCC.

The RADD shall transmit in the 10.50 - 10.55 GHz or 24.00 - 24.25 GHZ frequency band and shall meet the power transmission requirements specified under sections 15.245 and 15.249 of CFR 47.

The manufacturer shall provide documentation proving compliance to all FCC specifications.

M. NEMA 4X Testing

The RADD enclosure shall conform to test criteria set forth in the NEMA 250 Standard for Type 4X enclosures. Third party enclosure test results shall be provided for each of the following Type 4X criteria:

- External Icing (NEMA 250 Clause 5.6)
- Hose-down (NEMA 250 Clause 5.7)
- 4X Corrosion Protection (NEMA 250 Clause 5.10)
- Gasket (NEMA 250 Clause 5.14)

N. NEMA TS2-1998 Testing

The RADD shall comply with the applicable standards stated in the NEMA TS2-1998 Standard. Third party test results shall be made available for each of the following tests:

- Shock pulses of 10g, 11 ms half sine wave
- Vibration of .5 Grms up to 30 Hz
- 300 V positive/negative pulses applied at 1 pulse per second at minimum and maximum DC supply voltage
- Cold temperature storage at -45° C for 24 hours

- High temperature storage at +85° C for 24 hours
- Low temp, low DC supply voltage at -34° C and 10.8 VDC
- Low temp, high DC supply voltage at -34° C and 26.5 VDC
- High temp, high DC supply voltage at 74° C and 26.5 VDC
- High temp, low DC supply voltage at 74° C and 10.8 VDC

O. Support

Installers and operators of the RADD shall be fully trained in the installation, auto-configuration and use of the device.

The manufacturer shall thoroughly train installers and operators to correctly perform the tasks required to ensure accurate RADD performance. The amount of training necessary for each project shall be determined by the manufacturer and shall be included, along with training costs, in the manufacturer's quote. In addition, technical support shall be available to provide ongoing operator assistance.

1. Training

Training shall consist of comprehensive classroom labs and on-hands, in-the-field installation and configuration training.

Classroom Lab training shall involve presentations outlining and defining the RADD, its functions and the procedures for proper operation. These presentations shall be followed by hands-on labs in which trainees shall practice using the equipment to calibrate and configure a virtual device. To facilitate the classroom presentation and hands-on labs, the vendor shall provide the following items for the duration of training:

- Knowledgeable trainer or trainers thoroughly familiar with the RADD and its processes.
- Presentation materials, including visual aids, printed manuals and other handout materials for each student.
- Computer files, including video and raw data, to facilitate the virtual calibration and configuration of the RADD.
- Laptop computers with the necessary software, and all necessary cables, connectors,
- All other equipment necessary to facilitate the virtual calibration and configuration of the RADD.

Field Training shall provide each trainee with the hands-on opportunity to install and calibrate the RADD in the field. Training shall be such that each trainee will mount and align the RADD correctly.

2. Technical Assistance

A manufacturer's technical representative shall be available to assist with the physical installation, alignment and auto-calibration of each supplied RADD. Technical support shall

be provided thereafter to assist with troubleshooting, maintenance, or replacement of devices should such services be required.

P. Documentation

The following documentation and specification test results shall be supplied by the manufacturer at the time of the bid submittal. Attached documents shall include the following:

- Auto-calibration documentation
- EN 61000-4-5 Class 4 Lightning Surge Protection test results
- FCC CFR 47 certification
- NEMA 250 Standard for Type 4X Enclosure third-party test data
- NEMA TS2-1998 Standard third-party test data

Q. Warranty

The RVSD shall be warranted to be free from material and workmanship defects for a period of two (2) years from date of shipment.

1131.04.01 – RADAR VEHICLE TRAFFIC COUNT & SPEED DETECTION SYSTEM (Updated 12/12/11)

A. General Information

This item shall govern the purchase and installation of above ground Radar Vehicle Sensing Devices (RVSD) for freeway and arterial side fire traffic counting and speed detection. The radar detection units shall be equivalent to the Wavetronix SmartSensor in High Definition. (HD^{TM}) (sidefire units)

B. Product Description

The Radar Vehicle Sensing Device shall be a non-intrusive device equivalent to the Wavetronix SmartSensor HD. The RVSD shall also:

- Be easy to install.
- Automatically configure up to ten lanes of traffic by determining lane boundaries and detection thresholds.
- Utilize a digitally-generated, modulated signal to accurately detect vehicle volume, speed, and occupancy in all weather conditions without performance degradation.
- Operate accurately in side-fire installations.
- Be remote accessible.
- Provide multiple connectivity options for easy integration into legacy systems.
- Support a variety of data protocols.
- Be manufactured to the strictest industry standards.
- Utilize automated assembly processes to ensure product quality and minimize the risk of failure due to error.

The manufacturer shall thoroughly train installers and operators to ensure accurate RVSD performance.

C. Auto-Configuration

The RVSD shall have a method for automatically configuring the detection device. This auto-configuration method shall execute on a processor internal to the RVSD and shall not require an external PC or other processor. This auto-configuration method shall automatically define traffic lanes or detection zones by detecting the relative position of vehicles within the RVSD's field of view.

The RVSD shall include a transceiver capable of detecting multiple vehicles present within its field of view. The RVSD shall also include a processor or computer with executable instructions that estimates the position of each of the vehicles, records the position of the vehicles, generates a probability density function estimation from each position of the vehicles, and defines traffic lanes from that probability density function estimation. The vehicle probability density function represents the probability that a vehicle will be located at any range.

The auto-configuration method shall automatically, with no user intervention, assign lane or

zone boundaries and detection thresholds using the statistical representation of the relative vehicle positions. The auto-configuration method shall not prohibit the ability of the user to manually adjust the RVSD configuration. Documentation demonstrating the auto-configuration process shall be provided.

D. Sensor Performance

The RVSD shall provide accurate, real-time volume, average speed and occupancy data. A single RVSD shall detect up to ten lanes of traffic simultaneously. Detections shall be correctly categorized into four length-based classifications. True vehicle detections shall occur within a range of 9 ft. to 250 ft. from the RVSD.

The RVSD shall maintain accurate performance in all weather conditions, including: rain, freezing rain, snow, wind, dust, fog and changes in temperature and light. The device shall not rely on temperature compensation circuitry and shall be capable of continuous operation over an ambient temperature range of -40°C to 75°C, and a relative humidity range of 5 percent to 95 percent (non-condensing). RVSD operation shall continue in rain or snow up to ten centimeters per hour.

Test data demonstrating or proving performance shall be provided.

1. Volume Data

Volume data shall be accurate within five percent of truth for any direction of travel in nominal conditions. Individual lane accuracy shall be within ten percent of truth during nominal conditions. Nominal conditions exist when traffic is flowing at speeds greater than 10 miles per hour, with less than 10 percent truck traffic per lane and at least 30 percent of each vehicle visible above roadway barriers for true sensor detection.

The number of missed vehicles and false detections shall be recorded. Errors shall be calculated by dividing the difference between missed and false detections by the total number of vehicles. To ensure low variability in performance, missed and false detections shall not exceed 15 percent. Such performance analysis shall be provided for the following environments:

- Free flowing traffic (speeds greater than 45 mph)
- Congested traffic (speeds from 15 to 40 mph)
- Traffic with a lane roughly five ft. beyond a concrete barrier
- 20 foot and 240 foot lateral offset (simultaneous performance)

2. Speed

Speed shall be a measured quantity using a dual antenna radar speed trap; and shall not be derived from a presence measurement as this has been shown to produce biases during congestion. Average speed data shall be accurate within three mph for each lane, and 90 percent of individual vehicle speed estimates shall be within four miles per hour for any direction of traffic and for all conditions.

3. Occupancy Data

Occupancy data shall be accurate within 10 percent of truth for any direction of travel on a roadway. For example, if the true occupancy in a lane is 20 percent, then the measured occupancy shall be between 18 and 22 percent. Lane occupancy shall be accurate within 20 percent in similar conditions. Test data verifying this performance shall be provided.

2. Classification Data

Classification data shall be accurately determined for 80 percent of detected vehicles. Vehicles shall be separated into four user-definable classifications. Test data verifying this performance shall be provided.

E. Performance Maintenance

The RVSD shall not require cleaning or adjustment to maintain performance. It also shall not rely on battery backup to store configuration information.

Once the sensor is calibrated, it shall not need recalibration to maintain performance unless the roadway configuration changes. In that case, the RVSD's remote connectivity shall allow operators to reconfigure and recalibrate the sensor automatically.

F. Range Resolution

To achieve the specified accuracy in a variety of conditions, the resolution shall not be larger than ten ft. null to null and four ft. at the half-power level. This requires a functional bandwidth of 240 MHz. This reduces the problem of vehicle responses getting drowned out by brighter vehicles in adjacent lanes and improves performance for moving and stopped vehicles near barriers.

G. Mounting and Installation

To achieve the specified accuracy and reliability, the RVSD shall be installed according to the following conditions:

- Two RVSD units shall not be mounted so that they are pointed directly at each other.
- An RVSD shall not be placed within 20 ft. of another RVSD unless each device is configured to operate on a different RF channel using the installation software.

1. Mounting Assembly

The RVSD shall be mounted directly onto a mounting assembly fastened to a pole, overhead mast-arm, or other solid structure. The mounting assembly shall provide the necessary degrees of rotation to ensure proper installation. It shall be constructed of weather resistant materials and shall be able to support a 20-pound load.

2. Side-Fire Mounting

The RVSD shall be mounted according the following table, based on a recommended offset of 20 ft. or more from the first detection zone:

0	ffset from first	Recommended	Minimum	Maximum
	letection lane	Mounting	Mounting	Mounting
	(feet)	Height (feet)	Height (feet)	Height (feet)
	10	12	9	15
	11	12	9	16
	12	13	10	16
-	13	13	11	17
	14	14	11	17
	15	15	12	18
	16	15	12	18
	17	16	13	18
	18	17	14	19
	19	17	14	19
	20	18	15	20
	21	18	15	21
	22	18	16	22
	23	19	16	23
	24	19	16	24
	25	20	17	25
	26	20	17	26
set	27	21	18	27
병	28	21	18	28
eq	29	21	18	29
la Pu	30	22	19	30
E E	31	22	19	31
ΙÖ	32	22	19	32
Recommended Offset	33	23	19	33
	34	23	19	34
	35	23	20	35
	36	23	20	36
	37	23	20	37
	38	24	21	38
	39	24	21	39
	40	25	22	40
	41	25	22	41
	42	26	22	42
	43	26	22	43
	44	27	23	44
	45	27	23	45
	46	28	23	46
	47	28	24	47

48	29	24	48
49	29	24	49
50 ft. to 180 ft.	30	25	Height must be less than the offset (i.e. if offset = 80', the maximum height is also 80')

NOTE: Depending on the site and type of traffic, the sensor may tend to over count or under count. If the sensor is over counting, reduce the height of the sensor by 3 ft and reconfigure the sensor. If the sensor is under counting, increase the height of the sensor by 3 ft. Reducing the height of the sensor normally improves performance.

The RVSD shall be mounted with its cable connector pointing towards the ground and tilted so that the RVSD is aimed at the center of the lanes to be monitored. Typically, the RVSD is tilted off of vertical by 10-20 degrees. The RVSD shall be aligned so that the side-to-side (azimuth) angle is within approximately ± 2 degrees of perpendicular to the flow of traffic. Software shall be available to verify the accuracy of the azimuth pointing angle.

If multiple RVSD units are pointed in the same direction, each shall be configured to operate on a different RF channel.

A distance of 40 ft. (or more), along the direction of the roadway, shall separate the RVSD's if they are located on opposing sides of a roadway.

When possible, the RVSD pole placement shall be selected where there is no guardrail or other type of barrier between the pole and the first lane of traffic.

When possible, the RVSD pole placement shall be selected where there are no large planar surfaces (sound barrier, building, parked vehicles, etc.) that run parallel to the monitored roadway within 70 ft. of the pole location.

It is recommended that the manufacturer be consulted to verify final RVSD placement if the RVSD is to be mounted near large planar surfaces (sound barrier, building, parked vehicles, etc.) that run parallel to the monitored roadway.

3. Cabling

The RVSD shall be supplied with a connector cable of the appropriate length for each installation site.

The connector shall meet the MIL-C-26482 specification. The backshell shall be an environmentally sealed shell that offers excellent immersion capability, and is designed to interface with the appropriate MIL-C-26482 connector. All conductors that interface with the connector shall be encased in a single jacket; and the outer diameter of this

jacket shall be within the backshell's cable O.D. range to ensure proper sealing. The backshell shall have a clamp bar-style strain relief with enough strength to support the cable slack under extreme weather conditions. Recommended connectors are Cannon's KPT series; and recommended backshells are Glenair Series 37 cable sealing backshells. The MIL-C-26482 connector shall provide contacts for all data and power connections.

If communication is conducted over the RS-485 bus, then the communication cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Shielded, twisted pairs with a drain wire
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/ ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000 ft
- Single continuous run with no splices allowed
- Terminated only on the two farthest ends of the cable.
- The operational baud rate and cable length shall not exceed the following limits:

Baud Rate	*Cable Length	
115.2Kbps	300Feet	
57.6Kbps	600Feet	
38.4Kbps	800Feet	
19.2Kbps	1000Feet	
9.6Kbps	2000Feet	

NOTE: These represent maximum data rates. The data rate used should be the minimum data rate required for operation.

If communication is conducted over the RS-232 bus, the communication cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Shielded, twisted pairs with a drain wire
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/Ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000Ft
- Single continuous run with no splices allowed
- The RS-232 Driver must be able to source and sink +/- 7mA or more
- The operational baud rate and cable length shall not exceed the following limits:

Baud Rate	*Cable Length	
115.2Kbps	40Feet	
57.6Kbps	60Feet	
38.4Kbps	100Feet	
19.2Kbps	140Feet	
9.6Kbps	200Feet	

NOTE: These represent maximum data rates. The data rate used should be the minimum data rate required for operation.

If 12 VDC is being supplied for the RVSD, the power cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Two shielded, twisted pairs with two drain wires connected in parallel
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/ ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000 ft
- The cable length shall not exceed 100 ft.

If 24 VDC is being supplied for the RVSD, the power cable shall be Belden 9331 or an equivalent cable with the following specifications:

- Two shielded, twisted pairs with two drain wires connected in parallel
- Nominal Capacitance Conductor to Conductor @ 1Khz <= 26pF/ ft
- Nominal Conductor DC Resistance @ 20 Deg C <= 15 ohms/1000 ft
- The cable length shall not exceed 600 ft.

If a cable length of 600 ft. to 2000 ft. is required, the power cable shall be an ANIXTER 2A-1002 or equivalent cable that meets the following requirements:

- 10 AWG Conductor Size/Gauge
- Two Conductor count
- Stranded Cable Type
- Bare Copper material
- 600 Volt range
- 90° Centigrade Temperature rating
- PVC/Nylon Insulation material
- PVC Polyvinyl chloride jacketing material
- 40 Amps per conductor

Both communication and power conductors can be bundled together in the same cable as long as the above-mentioned conditions are met.

4. Lightning Surge Protection

Lightning surge protection that meets or exceeds the EN 61000-4-5 Class 4 specifications shall be installed no farther than 40 ft. along the RVSD cable from the RVSD unit. To ensure the continued operation of the RVSD in the presence of electrical surges, all connections to the RVSD shall be protected including power, RS-232 communication lines, RS-485 communication lines, and ground. The lightning surge protection unit shall be the Wavetronix Click! 200™ or equivalent.

5. Power Supply

The AC-to-DC power converter, supplying the DC voltage for the RVSD, shall provide the following:

Power Rated	>15 W @25°C / 10> W@74°C minimum per RVSD unit	
Operating Temperature	From -34°C to +74°C	
Range		
Operating Humidity Range	From 5% to 95% @25°C non-condensing	
Input Voltage	From 85 V (AC) to 264 V (AC) or 120 V (DC) to 370 V (DC)	
Input Frequency	From 47 Hz to 63 Hz	
Output Voltage	24 VDC ±4%	
Hold Up Time	>20 ms at 120 V (AC)	
Withstand Voltage	Input to Output: 2 kV, Input to Ground: 1.5 kV	
Safety Standards	UL 60950, EN60950	
EMC Standards	EN55022 Class B and EN61000-3-2, 3	
Brown-Out Protection	In brown-out conditions (i.e. <85VAC input) the output	
	voltage shall be less than 1 VDC	

H. Communication

The RVSD shall provide two or more communication ports that can be accessed simultaneously using any RVSD-supported protocol. This will enable multiple operators to collect data from the RVSD at the same time without interrupting or interfering with each other.

The RVSD shall provide both RS-232 and RS-485 communication. Both communication ports shall support all of the following baud rates: 9600, 19200, 38400, 57600 and 115200. Additionally, the RS-232 port shall be full-duplex and shall support true RTS/CTS hardware handshaking for interfacing with various communication devices. A Wavetronix Click 301 (Serial to Ethernet) shall be used in all ACHD cabinets that are tied into the ACHD fiber optic cable network.

1. Data Protocols

The RVSD shall support three different data protocols for all lanes being monitored: Interval (bin) data, Event (per vehicle) data, and Real-time True Presence data. The data protocol document shall be provided free of charge.

The Interval (bin) data packet protocol shall support:

- One or more detection zones of data per packet
- Sensor ID
- 32-bit or larger time stamps in one second or smaller increments that indicate the end of time interval
- Total volumes of more than 65536 (necessary for time intervals greater than 10 minutes)
- Speed values in either "Miles Per Hour" or "Kilometers Per Hour"
- Occupancy in 0.1 percent increments
- Four types (or more) of vehicle classifications with volumes per class

The Event (per vehicle) data packet protocol shall support:

- Sensor ID
- 32-bit time stamps in 2.5 millisecond increments or less that indicate the time the vehicle left the detection zone
- Speed values in either "Miles Per Hour" or "Kilometers Per Hour"
- Resolution of vehicle duration in the detection zone in 2.5 ms increments or less
- Four types (or more) of vehicle classification

The Real-time True Presence data packet protocol shall support:

- Sensor ID
- True presence information for each lane being monitored

2. Data Buffering

The RVSD shall store 24,000 (or more) Interval (bin) data packets that record volume, average speed, eighty-fifth percentile speed, occupancy, and class for each detection zone with at least ten zones and no groups per packet in non-volatile memory.

I. Power Requirements

The RVSD shall consume less than 9 watts with a DC input between 12 VDC and 28 VDC.

The equipment shall be designed such that the failures of the equipment shall not cause the failure of any other unit of equipment. Automatic recovery from power failure shall be within 15 seconds after resumption of power.

J. Windows CE®-based Software

The RVSD shall also include graphical user interface software that displays all configured lanes and the current traffic pattern using a graphical traffic history representing at least the last 1.5 seconds of detected traffic. This graphical traffic history shall also allow the option of displaying the measured speed or length of a detected vehicle.

The graphical interface shall operate on Windows CE, Windows 98, Windows 2000, Windows NT 4.0 and Windows XP Pro in the .NET framework. The software shall:

- Automatically select the correct baud rate and serial communication port from up to 15 serial communication ports
- Operate over a TCP/IP connection
- Support a dial-up modem connection
- Give the operator complete control over the configuration process
- Give the operator the ability to save the configuration information to a file or reload the RVSD configuration from a file using the graphical user interface software

Using the installation software, the operator shall be able to easily change the baud rate on the sensor by selecting baud rates from a drop-down list, as well as add response delays for the communication ports. Additionally, the operator shall have the ability to switch between data pushing and data polling, and change the RVSD's settings for Flow Control from none to RTS/CTS and vice versa.

The operator shall be able to upload new firmware into the RVSD's non-volatile memory over any supported communication channel including TCP/IP networks.

K. RF Design

The circuitry shall be void of any manual tuning elements that could lead to human error and degraded performance over time.

All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 parts per million (ppm) stable over the specified temperature range, and ages less than 6 ppm per year. Any upconversion of a digitally-generated modulated signal shall preserve the phase stability and frequency stability inherent in the digitally-generated signal. These specifications ensure that, during operation, the RVSD strictly conforms to FCC requirements and that the radar signal quality is maintained for precise algorithmic quality.

The RVSD antennae shall be designed on printed circuit boards, eliminating the need for RF connectors and cabling that result in decreased reliability. Printed circuit antennae are less prone to physical damage due to their extremely low mass.

The antennae parameters shall meet the following two-way criteria to ensure quality performance:

6 dB Elevation Beam Width: > 65 degrees3 dB Azimuth Beam Width: < 6 degrees

• Side Lobes: < -40 dB

L. Enclosure

The RVSD shall be enclosed in a Lexan polycarbonate, ultraviolet-resistant material and shall be classified as watertight according to the NEMA 250 Standard.

The enclosure shall be classified "f1" outdoor weatherability in accordance with UL 746C.

The RVSD shall be able to withstand a drop of up to five ft. without compromising its functional and structural integrity.

M. Input File Cards

The RVSD manufacturer shall provide an optional input file card compatible with 170, 2070, NEMA TS1, and NEMA TS2 input file racks. The input file card shall translate per vehicle data packets or real-time true presence packets from the RVSD into corresponding contact closure

outputs. Operators shall be able to assign any contact closure output channel to any lane or detection zone. These settings shall be saved in non-volatile memory on the input file card for complete recovery in case of power failure.

The input file card shall support Dual Loop (Speed Trap) emulation, as well as the following modes of operation:

- Pulse (a single 125 ms output pulse for each vehicle)
- **Presence** (an output pulse corresponding to the duration of each vehicle in the detection zone with a resolution of 2.5 ms)
- Actuation (true presence output in real time with 2.5 ms resolution)
- Single Loop Speed (duration of the pulse corresponds directly to the speed of the vehicle, speed (mph) = 13.64/duration in seconds)

The input file card shall receive data packets over an RS-485 bus at any of the following baud rates: 9600, 19200, 38400, 57600 and 115200. The input file card shall also auto-baud and auto-detect an RVSD over wired and wireless communication channels that have a maximum latency of 500 ms.

The Input file card shall comply with the NEMA TS2-1998 Traffic Controller Assemblies with NTCIP Requirements (Section 2.8 specification). Documentation and results of the NEMA TS2-1998 test shall be provided.

Additionally, the input file card shall comply with the EN 61000-4-5 Class 4 lightning surge protection test specification. Documentation and results of the EN 61000-4-5 Class 4 test shall be provided.

N. Manufacturing Requirements

The RVSD shall be manufactured and assembled in the U.S.A. The internal electronics of the RVSD shall utilize automation for surface mount and wave solder assembly, and shall comply with the requirements set forth in IPC-A-610C Class 3, Acceptability of Electronic Assemblies.

The RVSD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include:

- Functionality testing of all internal sub-assemblies
- Unit level burn-in testing of duration 48 hours or greater
- Final unit functionality testing prior to shipment

Test results and all associated data for the above testing shall be provided, for each purchased RVSD by serial number, upon request. Additionally, manufacturing quality data shall be maintained for each purchased RVSD by serial number and shall be made available upon request.

Externally, the RVSD shall be modular in design to facilitate easy replacement in the field. The total weight of the RVSD shall not exceed five pounds.

All external parts shall be made of corrosion resistant material, and all materials shall be protected from fungus growth and moisture deterioration.

O. FCC

Each RVSD shall be Federal Communications Commission (FCC) certified under CFR 47, Part 15, section 15.249 as an intentional radiator. This certification shall be displayed on an external label on each device according to the rules set forth by the FCC.

The RVSD shall transmit in the 24.00 - 24.25 GHz or another approved frequency band with 250 MHz of bandwidth available and shall comply with the appropriate requirements.

The manufacturer shall provide documentation proving compliance to all FCC specifications.

P. NEMA 4X Testing

The RVSD enclosure shall conform to test criteria set forth in the NEMA 250 Standard for Type 4X enclosures. Third party enclosure test results shall be provided for each of the following Type 4X criteria:

- External Icing (NEMA 250 Clause 5.6)
- Hose-down (NEMA 250 Clause 5.7)
- 4X Corrosion Protection (NEMA 250 Clause 5.10)
- Gasket (NEMA 250 Clause 5.14)

Q. NEMA TS2-1998 Testing

The RVSD shall comply with the applicable standards stated in the NEMA TS2-1998 Standard. Third party test results shall be made available for each of the following tests:

- Shock pulses of 10g, 11 ms half sine wave
- Vibration of 0.5 Grms up to 30 Hz
- 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage
- Cold temperature storage at -45° C for 24 hours
- High temperature storage at +85° C for 24 hours
- Low temp, low DC supply voltage at -34° C and 10.8 VDC
- Low temp, high DC supply voltage at -34° C and 26.5 VDC
- High temp, high DC supply voltage at 74° C and 26.5 VDC
- High temp, low DC supply voltage at 74° C and 10.8 VDC

R. Support

Installers and operators of the RVSD shall be fully trained in the installation, auto-configuration, and use of the device.

The manufacturer shall thoroughly train installers and operators to correctly perform the tasks required to ensure accurate RVSD performance. The amount of training necessary for each project shall be determined by the manufacturer and shall be included, along with training costs, in the manufacturer's quote. In addition, technical support shall be available to provide ongoing operator assistance.

1. Training

Training shall consist of comprehensive classroom labs and on-hand, in-the-field, installation and configuration training.

Classroom Lab training shall involve presentations outlining and defining the RVSD, its functions, and the procedures for proper operation. These presentations shall be followed by hands-on labs in which trainees shall practice using the equipment to calibrate and configure a virtual device. To facilitate the classroom presentation and hands-on labs, the vendor shall provide the following items for the duration of training:

- Knowledgeable trainer or trainers thoroughly familiar with the RVSD and its processes.
- Presentation materials, including visual aids, printed manuals and other handout materials for each student.
- Computer files, including video and raw data, to facilitate the virtual calibration and configuration of the RVSD.
- Laptop computers or Windows CE hand-held devices with the necessary software, and all necessary cables, connectors, etc.
- All other equipment necessary to facilitate the virtual calibration and configuration of the RVSD.

Field Training shall provide each trainee with the hands-on opportunity to install and configure the RVSD at roadside. Training shall be such that each trainee will mount and align the RVSD correctly.

2. Technical Assistance

A manufacturer's technical representative shall be available to assist with the physical installation, alignment, and auto-configuration of each supplied RVSD. Technical support shall be provided thereafter to assist with troubleshooting, maintenance, or replacement of devices should such services be required.

S. Documentation

The manufacturer shall supply the following documentation and specification test results at the time of the bid submittal. The following documents shall be attached:

- Auto-configuration documentation
- Volume accuracy data, including performance analyses for:
 - o Free-flowing traffic

- o Congested traffic
- o Traffic with a lane roughly eight ft. beyond a concrete barrier
- o 20 foot and 240 foot lateral offset (simultaneous)
- Speed accuracy test data for both per-vehicle and average speed
- Occupancy accuracy test data
- Vehicle classification test data
- EN 61000-4-5 Class 4 Lightning Surge Protection test results
- FCC CFR 47 certification
- NEMA 250 Standard for Type 4X Enclosure third-party test data
- NEMA TS2-1998 Standard third-party test data

T. Warranty

The RVSD shall be warranted free from material and workmanship defects for a period of two (2) years from date of shipment.

1131.05 — CONDUIT

(Revised 12/19/2011)

A. Materials

The Contractor shall provide and install all conduit, locate wires, pull strings and necessary fittings at the locations noted on the Plans and as detailed herein. Conduit size shall be as indicated on the signal wiring schedule in the project plans. ACHD is not responsible for damage to/or locating conduits during the construction of the project.

Schedule 40 rigid plastic conduit (RPC) shall be used unless otherwise specified. Schedule 80 RPC or galvanized steel conduit shall be used when specified on the Plans. High Density Polyethylene (HDPE) conduit shall be used when specified on the Plans or approved by the ACHD Traffic Engineer. The connection from HDPE conduit to RPC conduit shall be made using a Cantex Expansion Coupling Part # 5144019 or an approved ACHD equal. Aluminum conduit shall not be used. All conduit shall comply with the requirements of the National Electrical Code (NEC).

Conduits in junction boxes shall be sealed with a closed polyethylene plug that will prevent moisture and foreign material from entering the signal conduits. All conduit ends shall be sealed with this plug using care to encase (surround) conductors or cables to achieve a secure seal. Contractor shall modify the plug to allow the conductors to penetrate the center of the plug while still maintaining a tight seal. Contractor shall insure that all modified plugs remain in one piece. Broken plugs and plugs that do not achieve a tight seal shall be rejected. All plugs shall be "Backer Rod" or approved equal by ACHD. Plugs shall be charcoal grey in color and of an appropriate size to properly seal the conduit, as recommended by the manufacturer. Approximately ½ inch of the plug length shall remain exposed after installation.

B. Installation

Jacking or drilling conduit shall only be allowed when specifically indicated on the Plans or approved by ACHD.

Conduits entering through the cabinet foundation shall be arranged toward the front of the cabinet for maximum accessibility. The conduit stub out in the controller cabinet is not to exceed 2 inches. See ACHD Standard Detail TS-1111.

A green #12 copper locate wire shall be installed in all conduits which are to receive future conductors. Locate wires shall have a minimum of five (5) feet of slack in each junction box with continuous continuity.

1131.10 — VEHICLE SIGNAL HEADS. LED INSERTS and MOUNTING HARDWARE (Revised 12/20/2011)

General Information

ACHD normally solicits bids for a vehicle signal heads on an annual basis. All vehicle signal heads shall meet the requirements of the latest signal head bid specifications. The Contractor can obtain the latest bid specifications by contacting the ACHD Traffic Operations Supervisor.

All signal head displays shall have a minimum 30" wire leads equipped with 0.25" insulated female quick disconnect terminal connectors. A 4-position barrier type terminal block shall be mounted within each signal head group to accommodate up to 3 displays, for signal heads with more than 3 displays multiple 4-position barrier type terminal blocks shall be mounted each wired for maximum of 3 displays. 4-position barrier type terminal blocks shall be wired one side to the display module and the other side be left open for the field wires.

All vehicle signal heads shall be high performance LED modules manufactured by McCain Traffic Supply (Part Number MTS TP304PA or MTS TP324PA), 3 section, one way, 12 signal head or an ACHD approved equal. The signal heads shall be constructed of corrosion resistant, polycarbonate alloy, contain a minimum of 10% glass filled LEXAN and reinforced strengthening "ribbing" on inside top and bottom of each signal section and shall be traffic signal green and shall be equipped with 12 inch polycarbonate tunnel-type visors and vacuum formed 5 inch polycarbonate backplates. Three section signal heads must accept backplates with a 40.25" by 12.75" rectangular straight edged mounting flange. Three section heads shall have a minimum wind survivability rating for a single point mounting system of 80 MPH at 150 degrees F. Each head shall come complete with appropriate face arrangement and accessory hardware.

The accessory hardware shall consist of:

- 12" tunnel visor, polycarbonate
- o 5" back plate, angular polycarbonate
- Astro-Brac cable mounting assembly with 96 inch cables and stainless steel hardware
- A tunnel visor is required for each face
- Inside visor shall be finished in flat black
- The signal head and tunnel visors shall be traffic signal green. This color shall be an integral part of the signal head, not a surface coating.
- A terminal block shall be furnished and installed in the center section of the signal head. All
 display wires will have terminal connectors and will be fastened to the terminal block.
- Signal back plates shall be furnished in flat balck and shall fit the signal head properly. All back plates shall have minimum ½" reinforcing angles to stiffen the assembly.
- Each head shall be furnished with an Astro Brac cable mounting assembly, Pelco P/N: AB-3009 series with appropriate tube lengths for the supplied signal heads, stainless stell hardware and 96" mounting cables or equivalent. The mounting bracket shall be furnished but not installed on the signal head.
- Face arrangement quantities will be identified in the bid document .

All LED traffic signal modules shall also be warranted for 5 years against manufacturing defects.

All vehicle and pedestrian heads shall be securely and completely covered with an opaque material between installation and signal turn-on. Signal head covers shall be made of heavy, waterproof material and shall be securable by braided nylon rope or other ACHD approved method.

Signal Head Mounting

Signal heads shall be mounted using **PELCO Astro Bracket AB-3009 cable clamp kit and AB-4001 arm kit** or an ACHD approved equal. Mounting hardware shall provide for a rigid connection between the signal head and mast arm or pole.

Vehicle signal heads shall have 12 inch lenses. The highest intensity of the red indication in the signal head shall be aimed at a point four times the posted speed limit from the stop bar (measured in linear feet), unless otherwise directed by the ACHD Traffic Engineer.

Signal Head Positioning

The position of the signal heads shall be as specified on the Plans and these Supplemental Provisions, unless otherwise directed by the ACHD Traffic Engineer. The Contractor shall have all signal head locations verified in the field by the ACHD Signal Inspector prior to drilling holes in the signal mast arm. The ACHD Signal Inspector will require a minimum of two business days notice to schedule verification of traffic signal head locations. Signal heads shall be mounted on the mast arm such that the bottom of the signal head housing shall not be less than 17 feet nor more than 19 feet above the pavement grade at the center of the roadway. All signal head locations shall comply with the Manual on Uniform Traffic Control Devices (MUTCD).

LED Technical Performance

This technical performance specification is applicable to new signal and pedestrian heads supplied with LED displays and retrofit LED display kits for existing signal and pedestrian heads. The specification covers all LED red, green, yellow, hand, and man LED modules to be used in place of the incandescent lamp, reflector, socket, gasket, and lens assemblies for these heads.

Referenced vehicle type LED modules shall fit in all standard, incandescent vehicle traffic signal housings. Each module shall incorporate a printed circuit board inclusive of all of the LEDs and required circuit components, 39 inch 16 AWG wire leads with strain relief and spade terminals, a rigid housing for protection in shipping, handling and installation, and a one piece neoprene gasket. Screw-in type products are not allowed for vehicle signals.

Outer lenses for ball type modules shall be made of ultraviolet stabilized polycarbonate, and shall serve to enhance the optical efficiency of the LED traffic signal module. Red, green, and yellow ball type signals shall incorporate an inner fresnel lens that is sealed to the lamp housing, and serves to collimate the light emitted by the LED light engine. The outer lens shall serve to focus the collimated light and shall be tinted red, yellow and green, and meet ITE intensity and

distribution standards. Additionally, red, green, and yellow ball lamps shall approximate to the motorist the appearance of an incandescent traffic signal. The surface of red, green, and yellow ball LED lamps shall appear to the motorist as nearly totally uniform in illumination, and have a wide viewing angle that makes it suitable for installation on wide boulevards or single-tethered span wire. It shall not be apparent that LEDs are used as the light source for red, green, and yellow traffic signal ball type lamps. The external lens surface for <u>all</u> vehicle signals shall be smooth, with no raised features minimizing the collection of dirt, diesel smoke, and other particulate contaminates, and to facilitate periodic cleaning. External lens facets are not allowed. The lens shall be keyed to the housing of the LED signal module to insure the proper orientation and to avoid possible rotation during any handling. External lenses shall be hard-coated in compliance with Caltrans specifications.

The LEDs shall be mounted and soldered to a printed circuit board. The LED signal module shall be watertight when properly installed in a traffic signal housing. The LED signal module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly, and shall only require a screwdriver or standard installation tool to complete the mounting. The LED signal module assembly shall weigh less than 5 pounds. To minimize possible maintenance problems, the LED lamp module may not protrude into the signal visor area more than three-quarters of an inch in depth.

The housing of the LED signal module shall be marked 'TOP' to designate the proper orientation of the LED signal module in the traffic signal housing. Manufacturers part number, date of manufacture, and electrical characteristics of the LED signal module shall be visible on the rear of the assembly. A label shall be affixed to back of the red and green ball type modules, that certifies their complete compliance with the January 2005 ITE VTCSH, Part II specification for LED traffic signal modules and any current DOE regulations. All LED Modules must carry the Intertek ETL verified mark.

The LED traffic signal lamp manufacturer shall be ISO 9001 certified and a registered U.S. EPA Energy Star partner. With the exception of yellow ball lamps, all LED lamps shall be Energy Star compliant.

Optical

The light intensity, chromaticity, and distribution for red, green, and yellow ball and red, green, and yellow arrow LED signal modules, and LED pedestrian signals, shall have been tested by Caltrans, and found to be in compliance with Caltrans specifications. Additionally, red and green ball LED lamps shall meet the January 2005 ITE VTCSH Part II, standards and measurement criteria for LED traffic signal modules. Current test data verifying the compliance of red and green ball LED signals to the January 2005 ITE VTCSH, Part II specification shall be supplied from a certified independent testing lab. Current test data verifying compliance with Caltrans specifications shall also be supplied.

The control circuitry shall prevent the current flow through the LEDs in the off state to avoid any false indication as may be perceived by the human eye, during daylight and *evening* hours. The LED traffic signal module shall be operationally compatible with NEMA TS - 1 and NEMA TS - 2

conflict monitoring parameters. The intensity of the LED signal module shall not vary by more than 10% over the allowable voltage range as specified in the electrical section below.

Electrical

Power factor shall be 0.90 or greater, at nominal rated voltage and 25°C, after 60 minutes of operation. Total harmonic distortion (THD) shall be less than 20% at rated voltage, at 25°C.

All LED traffic signal modules shall be in compliance with FCC noise regulations and must meet the FCC Title 47, Subpart B Section 15 regulation.

The red, yellow, and Portland Orange LEDs shall utilize exclusively AllnGaP technology, either AS (Absorbing Substrate) or TS (Transparent Substrate), and shall not exhibit degradation of more than 30% of their initial light intensity following accelerated life testing (operating at 85 degrees C and 85% humidity, for 1000 hours). AlGaAs technology is not acceptable.

The green LEDs shall utilize Indium gallium nitride technology. Green LED traffic signal modules shall not be illuminated when the applied voltage is less than 35 VAC. They shall be illuminated (unregulated) when the applied voltage is 45 VAC to 80 VAC. Their illumination shall be in compliance with the January 2005 ITE VTCSH, Part II, when the applied voltage is between 80 VAC and 135 VAC.

The LED signal modules shall be connected directly to line voltage, 120 Volts AC nominal, and shall be able to operate over the voltage range of 80 VAC to 135 VAC.

The 12" red ball units shall consume no more than 10.5 watts at 120 VAC and 25 degrees centigrade. Maximum power consumption shall not exceed 17 watts at 120 VAC and 74 degrees centigrade.

Green ball LED traffic signal modules shall consume no more than 14.6 watts for 12" at 120 VAC and 25 degrees centigrade. Maximum power consumption shall not exceed 15 watts at 120 VAC and 74 degrees centigrade.

Yellow ball LED traffic signal modules shall consume no more than 22 watts for 12" lamps at 120 VAC and 25 degrees centigrade. Maximum power consumption shall not exceed 25 watts at 120 VAC and 74 degrees centigrade.

Red arrow type LED traffic signal modules shall be temperature-compensated so as to maintain intensity at elevated temperatures.

Combination hand-walking person LED Pedestrian signal modules shall incorporate a Lunar-white LED walking person symbol. The walking person symbol shall be filled-in. In order to insure accurate color transmittance, the module shall incorporate a replacement lens that is precisely matched to the dominant wavelength of the LEDs. The hand and walking person symbols shall be side by side. The hand symbol shall be filled-in. The hand and walking person symbols in the combination module, shall consume no more than a nominal 9 and 10 watts

each, respectively. The module shall be compliant with NEMA water penetration prevention standards.

All LED modules must incorporate a sensing and control circuit, capable of detecting proper operation of the module. This sensing circuit will disable the module in the event of a failure of either the LED driver circuit or the LED's not operating within defined limits. When the sensing circuit disables the module, the module shall not illuminate and appear as a failed incandescent lamp to conflict monitors and malfunction management units.

Transient voltage suppression rated at 1500 watts for 1 millisecond and fusing with a maximum rating of 2 amps shall be provided to minimize the effect and repair cost of an extreme over voltage situation or other failure mode.

LED Inserts/Modules

LED Modules Currently tested and Approved By ACHD (1/12/2012)

Red, Amber, and Full Green ball's

	Dialight	GELcore	*EOI	Duralight
Red Ball	433-1210-003XL	DR6-RTFB-17A	TRV-R125G-D2T	JXL300-HFTR
Amber Ball	433-3230-001XL	DR6-YTFB-17A-YX1	TRV-YI25G-DIT	JXL300-HFTY
Green Ball	4300-2220-001XL	DG6-GTFB-17A	TRV-G125G-D2T	JXL300-HFTG

	Leotek
Red Ball	TSL-12R-LX-IL3-A1
Amber Ball	TSL-12Y-LX-IL3-A1
Green Ball	TSL-12G-LX-IL3-A1

^{*}Excellence Opto, Inc.

Red arrow, Amber arrow, Green arrow

	Dialight	GELcore	*EOI	Duralight
Red Arrow	432-1314-001X-OD	DR6-RTAAN-17A	TRA-R12DG-IN	JXJ300-07TR03
Amber Arrow	431-3334-001X-OD	DR6-YTTAN-17A-YX	TRA-Y12DG-IN2	JXJ300-07TY03
Green Arrow	432-2374-001X-OD	DR6-GTAAN-17A	TRA-G12DG-IN	JXJ300-07TG03

	Leotek
Red Arrow	TSL-12RA-LD-A1
Amber Arrow	TSL-12YA-LD-A1
Green Arrow	TSI-12GA-LD-A1

Warranty

All LED traffic signal modules supplied shall be warranted for 5 years against manufacturing defects.

All red, green, and yellow ball LED traffic signal modules shall be performance warranted by the supplier to be in compliance with ITE minimum intensity standards for LED traffic signal modules, at 74 degrees centigrade, for a period of five (5) years. All red, green, and yellow arrow traffic signal modules, and 16" LED pedestrian modules shall be Caltrans approved. Additionally, red and green LED ball type traffic signals shall be warranted by the supplier to be in compliance with January 2005 ITE VTCSH, Part II specifications for five (5) years.

All LED modules and signal heads must be tested and approved by ACHD Traffic Operations prior to bid award.

1131.11 — PEDESTRIAN SIGNAL HEADS and MOUNTING HARDWARE

(Typically Supplied by ACHD) (Revised 04/21/2010)

A. General Information

ACHD normally solicits bids for a pedestrian signal heads on an annual basis. All pedestrian signal heads shall meet the requirements of the latest pedestrian head bid specifications. The Contractor can obtain the latest bid specifications by contacting the ACHD Traffic Operations Supervisor.

The pedestrian signal heads shall be high performance LED countdown modules manufactured by **McCain Traffic Supply, (Series 1000)** or an ACHD approved equal.

Combination hand-walking person LED Pedestrian signal modules shall incorporate a Lunar-white LED walking person symbol. The walking person symbol shall be filled-in. In order to insure accurate color transmittance, the module shall incorporate a replacement lens that is precisely matched to the dominant wavelength of the LEDs. The hand symbol shall be filled-in. The hand and walking person symbols in the combination module, shall consume no more than a nominal 9 and 10 watts each, respectively. The module shall be compliant with NEMA water penetration prevention standards.

All LED pedestrian signal modules shall also be warranted for 5 years against manufacturing defects.

The maximum overall dimension of the signal shall be 19 inches wide, 18 3/4 inches high, and 9 inches deep, including "Z" crate visor and hinges. The "Z" crate assembly shall be 1 inch to 1 1/2 inches deep. In order to facilitate installation and maintenance, the signal shall be designed so that all components are readily accessible from the front by opening the signal door.

B. Signal Head Mounting

Messages shall be International Symbols depicting a lunar white "walking person" and Portland orange "hand". The "hand" and "walking person" symbols shall be a minimum of 12 inches in height and 7 inches in width.

The case shall be a one-piece corrosion resistant aluminum alloy die casting. A one-piece neoprene gasket shall form a weather and moisture resistant seal. Integrally cast hinge lug pairs, two at the top and two at the bottom of each case, shall be provided for operation of a swing down door.

All vehicle and pedestrian heads shall be securely and completely covered with an opaque material between installation and signal turn-on. Signal head covers shall be made of heavy, waterproof material and shall be securable by braided nylon rope or other ACHD approved method.

1131.12 — PEDESTRIAN PUSH BUTTON ASSEMBLY

(Typically Supplied by ACHD) (Revised 11/11/08)

A. General Information

The pedestrian push button assembly (including sign) shall be as shown in ACHD Standard Detail TS-1108.

The Pedestrian push button assembly shall be manufactured by **Dick Campbell Company** or an ACHD approved equal.

The Contractor shall install the pedestrian push buttons and signs on the signal poles or pedestrian push button poles, as shown on the Plans or as determined by the ACHD Traffic Design Engineer.

B. Push Button Mounting

The push buttons will be mounted to the poles by means of bolts, as shown on the ACHD Standard Details. All mountings shall be securely fastened and approved by ACHD. The center of the pedestrian push buttons shall be 42 inches above grade (see ACHD Standard Details TS-1106 & TS-1108).

Each pedestrian push button should be located so that it points at the crosswalk for which it is intended to serve; however, final positioning for the optimum effectiveness shall be approved by the ACHD Signal Inspector prior to installation. The position of all pedestrian push buttons shall comply with the requirements of the **Americans with Disabilities Act (ADA)**.

1131.13 — LUMINAIRES AND LAMPS FOR INTERSECTION SAFETY LIGHTING

(Typically Supplied by ACHD) (Revised 04/21/2010)

A. General Information

The luminaires to be installed by the Contractor shall be for a 240 volt, 250 watt, high pressure sodium vapor light source with cutoff optics, unless otherwise shown on the Plans or directed by the ACHD Traffic Engineer.

Luminaires shall be standard ballast-in-head "Decashield" roadway type with a low-loss auto regulator ballast. The housing shall be finished in a durable black Lektrocote and employ a two-door system as manufactured by General Electric Lighting or an ACHD approved equal. The luminaires shall be GE Decashield 400, DSMT24S0A4GMC2BLR, including GE ESFBL-DS001 tenon mount or an ACHD approved equal.

The light source shall be horizontal burning. The luminaire shall have a reflector lens, a refractive lens, or a combination thereof, for controlling the light output. The luminaire shall produce a uniform pattern of light on the roadway.

B. Lamp Details

The lamp shall be clear burning, 240 volts, 250 watt high pressure sodium vapor units rated at a minimum of 30,000 initial lumens with an average rated life of 24,000 hours. The lamp shall be a **GE catalog number LU 250** or an ACHD approved equal.

The luminaires shall be incorporated into a circuit independent of any existing illumination circuits. The luminaries shall be controlled by an integral photoelectric control located in the service cabinet.

All luminaires require a fused connector at each pole base for each energized conductor. Contractor shall supply and use a **Busman Mfg. Tron in-line fuse holder, catalog number HEB-JW-RLC-J**, or an ACHD approved equal, with a 8 amp fuse.

All lighting conductor splices in junction boxes shall be made with the appropriate size sealed connector block suitable for wet locations. Contractor shall supply and use a **Blackburn or Elastimold USL-11**, **USL-30**, **or SEC Splice Box model SEC 0791-0 or an ACHD approved equal.**

1131.14 — CONCRETE FOUNDATIONS

(Revised 12/19/2011)

A. General Requirements

The Contractor shall provide all material and labor for the construction of the foundations for traffic signal poles, luminaire poles for intersection safety lighting, pedestrian push button poles, traffic signal controllers and service cabinets. All foundations shall be built to the dimensions specified in the contract Plans and these Supplemental Provisions. The anchor bolt pattern shall match that of the item to be installed thereon, and shall be arranged such that the item installed thereon will point in the proper direction.

Foundation bolts are typically supplied by ACHD. For the purpose of use tax, the cost of the foundation bolts shall be included in the cost of the signal poles, luminaire poles, controller cabinets, and service cabinets, unless otherwise specified in the contract documents.

All excess materials shall be removed from the construction site and shall be disposed of at the Contractor's expense.

Except in areas with high ground water tables, concrete for signal pole bases shall be placed in an appropriate size sono tube. In areas with a high ground water table, concrete for signal pole bases shall be placed in an appropriate size corrugated metal pipe. Excess water shall be removed before placing concrete.

Backfill around pole foundations shall be Controlled Density Fill (CDF) placed from the bottom of excavation to four feet below the finished grade. Augered (drilled) holes not in the water may be poured against native soil with only the four feet below the finished grade formed with a sono tube.

Contractor shall securely install the anchor bolts required for the item to be mounted on the foundation. Contractor shall install all conduit required. Concrete foundations shall be troweled, brushed, edged and finished to the satisfaction of the ACHD Resident Project Representative or ACHD Signal Inspector. Concrete shall be promptly cleaned from the exposed portion of the anchor bolts and conduit after placement. Foundations for all standards shall be Class "30 MPa (4000 psi)" concrete as specified in the latest adopted version of the Idaho Standards for Public Works Construction (ISPWC). Concrete and reinforcing steel shall be furnished and placed as shown in the contract plans.

Contractor shall seal the controller and service cabinets to the concrete foundation using an industrial grade RTV Silicone Sealant applied to the joint between the two after the cabinets are secured in place.

Concrete foundations shall be allowed to cure for a minimum of ten days, unless otherwise directed by the ACHD Resident Project Representative. The Contractor may install the traffic signal poles, controller cabinets, and service cabinets on the new foundations after the foundations have cured.

Concrete sidewalk removal required as part of the foundation installation shall be removed and replaced to the limits of existing joints.

All concrete foundation locations shall be approved by the ACHD Signal Inspector in the field prior to installation.

B. Pole Foundations

All pole foundations shall comply with ACHD Standard Detail TS-1110. The top of the signal pole base foundation elevation shall be provided by the Engineer on the design drawings.

- 1. When a pole foundation is placed adjacent to the back edge of the sidewalk, the top of the foundation shall be poured flush with the finished sidewalk grade. Where necessary, the sidewalk shall be notched around the foundation and a ¾ inch expansion joint shall be provided at all points where the foundation and sidewalk are in contact, such that the foundation can be removed without damage to the surrounding sidewalk.
- 2. When a pole foundation is placed in the sidewalk, the top of the foundation shall be 5 inches below the top of the sidewalk. The new sidewalk shall be installed on top of the new pole foundation. (See ACHD Standard Detail TS-1110.)
- 3. If no sidewalk exists, the top of the foundation shall be to the elevation provided by the Engineer on the design drawings or as directed by ACHD.

C. Controller Cabinet

The controller foundation shall conform to the ACHD Standard Detail TS-1111 included in these Supplemental Provisions. The exact location and orientation of the controller cabinet shall be approved in the field by the ACHD Signal Inspector prior to foundation installation. The ACHD Signal Inspector will require a minimum of two business days notice to schedule inspection of the controller cabinet location.

D. Service Cabinet

The concrete foundation for the service cabinet shall be poured as one piece with the controller cabinet foundation as shown in the ACHD Standard Detail TS-1111. All foundation locations shall be approved in the field by the ACHD Signal Inspector prior to installation.

E. Potholing for Signal Pole Locations

As directed by ACHD, the Contractor shall dig to expose any utility conflict at the proposed signal pole location. The Contractor shall call Digline two business days prior to potholing.

The potholes shall be:

- 1. Dug in such a manner to avoid any damage to existing utilities. Any damage done during potholing shall be the Contractor's responsibility;
- 2. Deep enough to accommodate proposed concrete bases;
- 3. Located as ACHD directs;
- 4. If utility conflicts exist then the Contractor shall immediately notify the ACHD Signal Inspector for direction. The Contractor shall also appropriately document the conflicts, backfill the holes and compact to 95% of the maximum dry density in 12 inch layers (or backfill with flowable CDF).

If no conflicts exist, the Contractor shall install the concrete foundations per plans.

1131.16 — EMERGENCY VEHICLE PREEMPTION SYSTEM

(Revised 11/01/11)

A. System Operation

A preempt signal shall be initiated by the closure of dry contacts and shall cause the intersection controller to hold or to advance by skipping phases to the green preempt phases shown in the Plans. The intersection controller shall provide for a yellow phase clearance interval to precede the red phase on all approaches to be stopped and shall also provide for an adjustable green hold interval. If calls are received from two opposing phases, the device shall respond to the first call first. A flashing "Don't Walk," other clearance, or minimum interval shall not be preempted or skipped.

The Contractor shall provide and install all of the equipment necessary to accomplish the preemption phases shown in the Plans.

Emergency Preemption System (EPS) equipment shall be manufactured by **Global Traffic Technology (GTT) Company** which shall include emitters, detectors, phase selectors and discriminators.

The EPS shall be capable of detecting and responding to an optical signal that has been received, and maintained for a period of 1.7 seconds from a vehicle-mounted optical emitter.

All EPS equipment shall operate over a temperature range of -40 degrees Fahrenheit to +175 degrees Fahrenheit and shall be electronically compatible with the intersection controllers typically supplied by ACHD.

B. Component Requirements

EPS equipment shall meet the following requirements:

1. Detector

(Typically Supplied by Fire Dept.)

The Contractor shall install **GTT Company 700 Series** preemption detectors at locations as shown in the Plans. Each emergency preemption detector shall be solid state device consisting of photoelectric cells and an amplifier mounted in a weather resistant housing. The detectors shall be capable of detecting an optical signal generated by an Opticom brand emitter assembly (**GTT Company**). The detectors shall detect the optical signals from the emitter, amplify the signals and transmit them to the phase selector.

2. Phase Discriminators

(Typically Supplied by Fire Dept.)

ACHD will install phase discriminator units as required to obtain the necessary phase discriminator channels for each leg of the intersection. The phase discriminator shall be a solid state, rack mounted device which shall provide power to the detectors. The phase discriminator shall receive the amplified signal from the detector, verify it as valid, and send

an input to the controller. This input shall be for the duration of the detected signal plus 8 to 10 seconds additional time after the signal is lost. Four channels shall be provided.

The phase discriminator shall also include the following features:

- 1. High and low priority discrimination
- 2. Settable signal intensity threshold for up to at least 2,500 feet
- 3. Computer based user interface
- 4. Front panel switches and indicators for testing
- 5. 20,000 priority/vehicle class/vehicle code ID combinations.

3. Detector Lead-in Cable

(Typically Supplied by ACHD)

The detector lead-in cable shall be a three conductor, shielded cable consisting of three #20 AWG stranded copper conductors, rated for 600 volts, and one #20 AWG drain wire. The detector lead-in cable shall be **GTT Company Opticom Model 138** shielded detector cable or an ACHD approved equal. No splicing will be allowed between the detector and the controller cabinet. Lead-in cable shall be installed from the controller cabinet to the end of the mast arm on all projects, whether Opticom is installed or not.

1131.21 — MEASUREMENT AND PAYMENT

(Revised 6/23/11)

Measurement and payment for work under Section 1131 of these Supplemental Provisions shall be made as described below.

A. Measurement

Measurement for work under Section 1131 shall be as follows:

1. Traffic Signal and Illumination System Complete

All work included in the Plans or specified herein, shall be considered as part of the work for "Traffic Signal and Illumination System Complete." No specific unit of measurement will apply, but measurement will be for the sum total of all items for a complete system to be furnished and installed.

2. Install Traffic Signal Interconnect Conduit

Traffic signal interconnect conduit shall be measured by the linear foot of conduit installed. This item includes a pull wire to be installed if the conduit does not receive the interconnect cable at the time of installation.

3. Install Traffic Signal Interconnect Junction Box

Traffic signal interconnect junction boxes shall be measured by the unit from actual count.

4. Install Interconnect Splice Vault

Interconnect splice vaults shall be measured by the unit from actual count.

5. Install Traffic Signal Interconnect Cable

Traffic signal interconnect cable shall be measured by the linear foot of interconnect cable installed. The type of interconnect cable to be installed shall be shown on the Plans.

6. Install Street Light

Street lights shall be measured by the unit from actual count. All labor, material and equipment required for a complete street light installation -shall be included in this item.

7. Install Street Lighting Conduit

Street lighting lighting conduit shall be measured by the linear foot of conduit installed. This item includes a pull wire to be installed if the conduit does not receive the street light cable at the time of installation.

8. Install Street Lighting Junction Box

Junction boxes for street lighting shall be measured by the unit from actual count.

B. Payment

The price for the bid items listed below shall be full compensation for all costs involved in furnishing all labor, material, tools and equipment necessary or incidental to the construction shown in the Plans and herein specified including but not limited to; saw cutting, excavation, back filling, concrete foundations, conduit, wiring, restoring facilities destroyed or damaged during construction, and for making all required tests. Any additional material and labor not shown in the Plans, or called for herein, and which are required to complete the specified systems, shall be incidental to the construction and included in the contract prices.

Payment shall be made for the following bid items:

Ref.	Bid Item	Unit
1131.01.01	Traffic signal and illumination system complete	lump sum (LS)
1131.01.02	Install Traffic Signal Interconnect Conduit	linear foot (LF)
1131.01.03	Install Traffic Signal Interconnect Junction Box	each (EA)
1131.01.04	Install Interconnect Splice Vault	each (EA)
1131.01.05	Install Traffic Signal Interconnect Cable	linear foot (LF)
1131.01.06	Install Street Light	each (EA)
1131.01.07	Install Street Lighting Conduit	linear foot (LF)
1131.01.08	Install Street Lighting Junction Box	each (EA)

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1134.01 — GENERAL REQUIREMENTS

(Revised 11/04/11)

A. Description of Work

This work shall consist of furnishing and installing traffic stripes and pavement markings upon the roadway surface and delineators adjacent to the roadway at locations shown in the Plans or as directed by the ACHD Traffic Engineer. This work shall also consist of installing surface mount channelizers as shown on the Plans or as directed by the ACHD Traffic Engineer. Removal of existing traffic stripes, pavement markings, raised pavement markers, channelizers and delineators shall be incidental to these items, unless other provisions are made in the contract documents.

All traffic stripes, pavement markings, channelizers and delineators shall be installed in conformance with the latest edition of the **Manual on Uniform Traffic Control Devices** (MUTCD), or as modified by the Plans and these Supplemental Provisions.

B. Layout

The Contractor shall layout all work and shall receive approval from the ACHD Traffic Engineer prior to installing traffic stripes and pavement markings. Layout shall consist of spot painting marks or lines which will delineate the traffic stripes and pavement markings to be installed. The ACHD Traffic Engineer shall require two business days notice to schedule layout inspection.

C. Tolerances and Appearance

Traffic stripes and pavement markings shall conform to the details shown in the plans and these Supplemental Provisions (see ACHD Standard Details TS-1112 and TS-1113).

Completed traffic stripes shall have clean and well defined edges without running or deformation, shall be uniform, shall be straight on tangent alignment, and shall be on a true arc on a curved alignment. The widths of completed traffic stripes shall not deviate more than ¼ inch on tangent nor more than ½ inch on curves from the widths shown on the plans. Broken traffic stripes shall also conform to the following requirements:

- 1. The lengths of the gaps and individual stripes that form broken traffic stripes shall not deviate more than two inches from the lengths shown on the plans and these Supplemental Provisions.
- The lengths of the gaps and individual stripes shall be of such uniformity throughout the entire length of each broken traffic stripe that a typical striping machine will be able to repeat the pattern and superimpose additional stripes upon the traffic stripe being applied.

The completed pavement markings shall have clean and well defined edges without running or deformation and shall conform to the dimensions shown on the plans and these Supplemental Provisions, except that minor variations may be accepted by the ACHD Traffic Engineer.

Drips, overspray, improper markings, and paint and thermoplastic material tracked by traffic shall be immediately removed from the pavement surface by methods approved by ACHD. All such removal work shall be at the Contractor's expense.

1134.02 — **OBLITERATION OF EXISTING PAVEMENT DELINEATION** (Revised 06/03/05)

A. Description

Existing traffic stripes, pavement markings, raised pavement markers, channelizers and delineators that conflict with the proposed project shall be removed as shown on the plans or as directed by ACHD; this work includes conflicting items outside of the rebuild or overlay limits.

B. Method of Removal

Painted markings and traffic stripes shall be removed by hydroblasting, sandblasting, or other methods approved by ACHD. Any damage to the road surface as a result of the Contractor's operations shall be repaired by the Contractor, at the Contractor's expense, as directed by ACHD. Painting over existing traffic stripes and pavement markings with paint, asphaltic products, etc., does not meet the requirements for obliteration.

Traffic stripes and pavement markings shall be removed to the fullest extent possible. The removal process shall be performed in a random pattern to prevent the creation of a recognizable pattern on the pavement surface. The removal process shall not be accepted if the "removed" pavement markings or traffic stripes can be confused with new pavement markings or traffic stripes.

Traffic stripes and pavement markings shall be removed before any change is made to the traffic pattern.

C. Payment

Removal of existing pavement markings, traffic stripes, raised pavement markers, channelizers and delineators shall be paid for as provided in the contract documents. If no bid item is provided for obliteration of existing pavement delineation, then removal of existing pavement markings, traffic stripes, raised pavement markers, channelizers and delineators shall be incidental to other bid items in the contract and no further compensation will be allowed.

1134.03 — PAVEMENT MARKINGS AND TRAFFIC STRIPES - PAINT

(Revised 06/03/05)

A. Description

This item shall consist of furnishing and applying painted traffic stripes and pavement markings, including glass beads.

B. Materials

1. Paint

The paint formula shall conform to **Federal Paint Specifications TT-P-115, Type II Fast Dry or TT-P-1952, Water Emulsion Base**. The viscosity range shall be between 70 Krebs units and 90 Krebs units (Ku).

The ACHD Resident Project Representative or the ACHD Traffic Engineer may, at their discretion, require the contractor to supply paint samples at random intervals for testing. When required, the Contractor shall provide ACHD with one quart samples of each color of paint to be used. One quart containers shall be supplied by ACHD. When testing is required by ACHD, the Contractor shall not install pavement markings and traffic stripes until ACHD has tested and approved the paint samples.

All pavement markings and traffic stripes placed with paint that does not meet the requirements specified herein shall be rejected and removed at the Contractor's expense.

Mechanical mixers shall be used to mix paint. Prior to applying, the paint shall be mixed a sufficient length of time to thoroughly mix the pigment and the vehicle together, and shall be kept thoroughly agitated during its application. Paint shall be homogeneous, free of contaminate and of a consistency suitable for use. Dispersion of pigment in vehicle shall be such that the pigment does not settle excessively, does not cake or thicken in the container, and does not become granular or curdled. Thinning of paint will not be allowed.

2. Glass Beads

Contractor shall supply glass beads suitable for both solvent based paint and water borne paint. Glass beads shall comply with Section 1134.07 of these Supplemental Provisions.

C. Installation

Marking configurations shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the project plans.

New asphalt pavement should have a minimum cure time of 24 hours prior to applying any pavement markings or traffic stripes. On new surfacing, pavement markings and traffic stripes shall be applied in two coats unless otherwise shown on the plans. The first coat of paint shall be dry before application of the second coat.

On existing surfacing, pavement markings and traffic stripes shall be applied in one coat.

Paint shall be applied only when the roadway surfaces are clean, thoroughly dry, and when the pavement temperature is between 50 and 85 degrees Fahrenheit and the relative humidity is less than 80%. Work conducted outside the stated temperature and humidity ranges shall be considered unacceptable. In the event of rain, work will be discontinued until the rain ceases and the above mentioned conditions are met. Any materials placed just prior to a rainstorm shall be considered unacceptable work if the applied materials exhibit any loss of integrity or are destroyed.

Each coat of paint shall be applied at the minimum rate of 1 gallon per 100 square feet. Beads shall be applied at the minimum rate of 6 pounds per gallon of paint. Beads shall be applied immediately following the application of the paint in such a manner as to insure good adhesion and reflection. Unless otherwise directed by the ACHD Traffic Engineer, glass beads shall be uniformly incorporated in all coats of paint concurrently with the application of the paint. Beads shall be embedded in the coat of traffic paint being applied to a depth of one-half their diameters.

The volume of paint applied shall be measured by stabbing the paint tank with a calibrated rod. At the option of the ACHD Resident Project Representative, if the striping machine is provided with paint gages, the volume of paint may be determined by using such gages.

The amount of glass beads applied shall be measured by stabbing the glass bead tank with a calibrated rod.

All equipment used in the application of traffic stripes and pavement markings shall produce traffic stripes and pavement markings of uniform quality that conform to the specified requirements.

Stencils and hand spray equipment shall be used to paint pavement markings. Stencils shall conform to the dimensions shown on the Plans and these Supplemental Provisions.

1134.04 — PAVEMENT MARKINGS AND TRAFFIC STRIPES - TAPE (Revised 06/03/05)

A. Description

This item shall consist of furnishing and applying tape for traffic stripes and pavement markings.

B. Materials

Tape used for permanent pavement markings and traffic stripes shall be manufactured by **3M Company, Flint Trading Inc.** or an ACHD approved equal. Tape to be used for traffic stripes shall be **3M Series 380, Flint Trading Premark** or an ACHD approved equal; tape for pavement

markings (symbols, word markings, crosswalks, stop bars, etc.) shall be **3M Series 420, Flint Trading Premark** or an ACHD approved equal.

C. Installation

Pavement markings and traffic stripes shall be installed in compliance with the manufacturer's installation instructions. Pavement marking and traffic stripe configurations shall be in compliance with the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)**.

When tape traffic stripes and pavement markings are to be applied to newly paved asphalt concrete surfaces, they shall be applied before public traffic is allowed on the freshly paved surface unless otherwise approved by the ACHD Traffic Engineer. Traffic stripes and pavement markings may be inlaid in the fresh surface during final rolling of the mat.

The Contractor shall provide application equipment, manual or automatic, as necessary for the job requirements. These applicators shall be capable of applying two 4 inch lines simultaneously with a 4 inch space between lines. These units shall be capable of applying an unlined precoated pressure sensitive adhesive tape for traffic stripes.

The manual unit shall have a manually actuated tape advance system and a foot operated cutting mechanism.

When tape is installed on portland cement concrete, the surface where the tape is to be installed shall be grooved (tined).

1134.05 — PAVEMENT MARKINGS AND TRAFFIC STRIPES - THERMOPLASTIC (Revised 06/03/05)

A. Description

This item shall consist of furnishing and applying thermoplastic traffic stripes and pavement markings, including glass beads.

B. Materials

1. Thermoplastic

a. Composition

The thermoplastic material shall be 100 percent solids. The binder shall consist of one of the following:

A maleic-modified glycerol ester of rosin and plasticizer and be homogeneously incorporated with all the prime pigments, fillers and glass beads to produce a traffic coating to meet the requirements as specified herein.

Synthetic hydrocarbon resins shall be homogeneously incorporated with all of the necessary prime pigments, fillers and glass beads to produce a traffic coating to meet the requirements as specified herein.

b. Form

The thermoplastic material shall be supplied in either block or granular form as required in the purchase request.

c. Application Type

The thermoplastic material shall be formulated as required in the purchase request.

d. Characteristics of the Finished Thermoplastic

Glass Beads, AASHTO M247 TYPE 1, percent by weight	<u>White</u> 25-30	<u>Yellow</u> 25-30
Inert fillers, insoluble in Hydrochloric acid, % pass USA Standard Sieve µm ASTM E11	100	100
Binder, percent by weight, minimum	18	18
Specific Gravity, maximum	2.15	2.15
Ring and Ball softening point ASTM E28, °C	93-121	93-121
Test on material after 4 hours heat with stirring at 218° C \pm 1° C, which includes 1 hour for the meltdown and temperature stabilization.		
Tensile bond strength to an unprimed sandblasted portland cement concrete block, 3.2 mm thick film drawn down at 218°C, tested at 24° \pm 1°C MPa, minimum	1.24	1.24
Brookfield Thermosel Viscosity, Spindle SC4-27, 20 RPM at 218°C, Pa.S Extruded Type	4.5-10	4.5-10

Low Viscosity Type, maximum	3.0	3.0
Impact Resistance, ASTM D2794 3.2 mm thick film drawn down at 218°C on an unprimed sandblasted portland cement concrete block. Male indentor 15.9mm, no Female die. Test at 24° \pm 1°C, kg-m with no cracks or bond loss, minimum	0.58	0.58
Daylight luminous Reflectance AASHTO Designation: T 250-94 Minimum	80	
Color-yellow, shall match Fed 595 Color No. 33538 and chromaticity Limits shall lie within: HUE = 580-583.5 nm Chroma x = 0.7050 - 0.5000y Brightness Y = 42-59		
Yellow Index, AASHTO Designation: T 250-94 calculated as Y.I.=100(A-B)/G, maximum	10	
Ultra Violet Light and Condensate Exposure, ASTM G53. 300 Hours Total: alternate 4 hours condensate Exposure at 40° C, 4 hours UV Exposure at 60°C		
White - Yellow index maximum Yellow - Must meet chromaticity as specified above	20 	 Pass
Abrasion Test - 400 grs. glass beads. 600-850μm, 0.15 MPa air pressure and cast sample 12.7cm x 12.7cm x 0.95 cm g loss, maximum	10	10
Hardness, Shore A-2 Durometer with 2 kg weight at 46°C	45-75	45-75

e. Other Requirements

The thermoplastic material shall readily apply at temperatures between 400°-450° Fahrenheit.

When applied to the pavement, the thermoplastic material shall be sufficiently tack-free to carry traffic in not more than 2 minutes when pavement surface temperature is at 50° Fahrenheit, and not more than 10 minutes when pavement surface temperature is 130° Fahrenheit.

When tested, granular yellow thermoplastics shall have an extractable lead content of less than 0.3mg/L.

f. Workmanship

The pigment, beads, and fillers shall be well dispersed in the binder. The material shall be free from all skins, dirt, foreign objects, and other deleterious substances, and shall be of such composition that it will not bleed, stain, or discolor when applied to pavements.

Thermoplastic material shall not emit fumes which are toxic or injurious to persons or property, when it is heated to application temperature. The material shall not emit excessive smoke during heating or application.

g. Shelf Life

The material shall maintain the requirements of this specification for a minimum period of one year. Any materials failing to do so shall be replaced by the manufacturer at the manufacturer's expense.

h. Air Pollution Compliance

This material shall comply with all applicable air pollution control rules and regulations.

i. Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) shall be provided by the manufacturer to include **HEALTH HAZARD** information on the material when it is heated to application temperature.

j. Inspection

This material shall be sampled and inspected as deemed necessary.

Manufacturers must submit the following information before shipment:

1. Color, white and yellow and tons of each

- 2. Form-block or granular
- 3. Type-extruded or low viscosity
- 4. Exact address of shipment
- 5. Number and identification of batches comprising shipment
- 6. Date of manufacture
- 7. Purchase order or contract number

The above information is to be sent to ACHD, Contract Administrator, 3775 Adams St., Garden City, Idaho 83714. On delivery, the thermoplastic will be sampled for compliance to specification. Material not meeting the specification shall be removed and replaced by the Contractor at the contractor's expense, including all cost for handling, testing and shipping.

k. Testing

All tests shall be performed according to the specified test method, latest revision. Qualitative and quantitative analysis may also be performed by X-ray diffraction, X-ray emission, infrared and other instrumental methods of analysis, at the option of ACHD.

I. Packing

i. Block Form

The thermoplastic material shall be packaged in suitable containers to which it will not adhere nor interact with during shipment or storage. The blocks of cast thermoplastic material shall be approximately 35 inches by 12 inches by 2 inches and shall weigh approximately 50 pounds.

ii. Granular Form

The thermoplastic material shall be packaged in meltable bags, which are compatible with the thermoplastic, and shall weigh approximately 50 pounds. The containers must have sufficient strength and be properly sealed to prevent breakage and leakage during normal handling.

iii. Marking

Each container label shall include: color, type of binder, low viscosity type, manufacturer's name and address, date of manufacture, and batch number. All marking on containers shall be legible and permanent. Markings shall not smear or rub off container. Containers failing to meet marking requirements will not be accepted.

The containers and labeling shall meet all applicable U.S. Department of Transportation and Interstate Commerce Commission regulations. Each container shall be labeled with all warnings or precautions that are required by local, state or Federal laws and regulations.

m. Certificate of Compliance

The manufacturer of thermoplastic materials shall furnish the Engineer with Certificate of Compliance in conformance with these supplemental provisions. The certificate shall also include a list, by title and section, of all applicable state and federal packaging and labeling laws and a statement that all requirements have been met.

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work, agrees to indemnify and save harmless Ada County Highway District and its duly authorized representatives from all suits at law or action of every nature for or on account of the use of any patented material, equipment, devices or processes.

2. Glass Beads

Contractor shall supply glass beads suitable for thermoplastic. Glass beads shall comply with Section 1134.07 of these Supplemental Provisions.

C. Installation

Existing surfacing which is to receive the thermoplastic material shall be mechanically wire brushed to remove all dirt and contaminants. Surfaces of new portland cement concrete pavement to receive the thermoplastic material shall be mechanically wire brushed or abrasive blast cleaned to remove all laitance and curing compound.

Existing pavement markers which are damaged by blast cleaning or wire brushing shall be removed and replaced by the Contractor at the Contractor's expense.

Thermoplastic material shall be applied only to dry pavement surfaces and only when the pavement surface temperature is above 50° Fahrenheit.

A primer, of the type recommended by the manufacturer of the thermoplastic material, shall be applied to all asphaltic surfaces over 6 months old and to all portland cement concrete surfaces. The primer shall be applied immediately in advance of, but concurrent with, the application of thermoplastic material. The primer shall be applied at the application rate recommended by the manufacturer and shall not be thinned.

Preheaters with mixers having 360 degree rotation shall be used to preheat material. The thermoplastic material shall be applied to the pavement at a temperature between 400° Fahrenheit and 425° Fahrenheit, unless a different temperature range is recommended by the manufacturer.

The thermoplastic material shall be applied by either spray or extrusion methods in a single uniform layer.

Stencils shall be used when applying thermoplastic material for pavement markings. The pavement surface to which thermoplastic material is applied shall be completely coated by the material and the voids of the pavement surface shall be filled.

Unless otherwise specified in the special provisions, the thermoplastic material for traffic stripes shall be applied at a minimum thickness of 0.060 inch. Thermoplastic material for pavement markings shall be applied at a thickness of 0.100 inch to 0.150 inch. Glass beads shall be applied immediately to the surface of the molten thermoplastic material at a rate of not less than 8 pounds per 100 square feet. The amount of glass beads applied shall be measured by stabbing the glass bead tank with a calibrated rod.

Glass beads may be added directly to the combined pigment, filler, and resin; however, prior to setting, all thermoplastic surfaces shall receive an additional one pound of glass beads per 100 square feet of thermoplastic.

1134.06 — PAVEMENT MARKINGS AND TRAFFIC STRIPES - EPOXY (Revised 05/20/99)

A. Description

This item shall consist of furnishing and applying epoxy traffic stripes and pavement markings, including glass beads.

B. Materials

1. Epoxy

Epoxy permanent pavement markings and traffic stripes shall be manufactured by **3M Company, Morton Company** or an ACHD approved equal. The manufacturer of the epoxy traffic stripes and pavement markings shall provide a minimum of a three year warranty.

Material Safety Data Sheets (MSDS) shall be provided by the manufacturer to include health hazard information on the material.

2. Glass Beads

Contractor shall supply glass beads suitable for epoxy traffic stripes and pavement markings. Glass beads shall comply with Section 1134.07 of these Supplemental Provisions.

C. Installation

Pavement markings and traffic stripes shall be installed in compliance with the manufacturer's installation instructions. Pavement marking and traffic stripe configurations shall be in compliance with the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)**.

Glass beads shall be applied to the surface of the epoxy pavement markings and traffic stripes at a rate of not less than 8 pounds per 100 square feet. Glass beads shall be applied simultaneously with or immediately after the application of the epoxy traffic stripes and pavement markings. The amount of glass beads applied shall be measured by stabbing the glass bead tank with a calibrated rod.

Unless otherwise specified in these Supplemental Provisions, the epoxy material for traffic stripes shall be applied at a minimum thickness of 0.060 inch. Epoxy material for pavement markings shall be applied at a thickness of 0.100 inch to 0.150 inch.

Contractor shall provide a three year warranty for all epoxy pavement markings and traffic stripes. Warranty shall include all labor and materials. After three years, all pavement markings and traffic stripes shall retain a minimum of 10% of the original reflectivity and a minimum of 80% of the original coverage area.

1134.07 — GLASS BEADS

(Revised 06/03/05)

The glass beads shall be manufactured by **The PD Corporation**, or an ACHD approved equal. Glass beads shall conform to **AASHTO M247-81**, **Glass Beads Used in Traffic Paints**, **Type I** with the following exceptions:

APPEARANCE – The spheres shall be transparent, clean, dry, free flowing, smooth, spherically shaped, and shall be free from milkiness, pits, excessive air bubbles, and foreign matter. The beads shall be colorless to the extent that they do not impart a contrasting color (i.e. brown, yellow or green) when applied to the white paint used for traffic stripes.

ROUNDNESS – The glass beads shall contain not less than 70% by weight of true spheres.

DUAL CHEMICAL COATING – The beads shall be coated with chemical compounds that provide both anti-wetting and adherence properties. The Contractor shall submit a certification statement that the beads will contain the dual coatings. The Contractor shall provide the names of the chemicals used and the appropriate testing methodology to confirm the presence of their coating. The Contractor shall submit the Materials Safety Data Sheets (MSDS) for the chemicals used in providing the dual coatings. If the Contractor feels that this information is proprietary, he shall mark all supplied pertinent information as confidential. All confidential information will be maintained by ACHD and not released. Contractor shall not install the glass beads until after this information has been submitted to and approved by ACHD. ACHD has the right to conduct testing as required to confirm that the dual chemical coatings are present.

The Contractor shall provide ACHD two 50 pound bags of glass beads for testing. Glass beads shall not be used until they have been approved by ACHD.

1134.08 — TEMPORARY STRIPING

(Revised 05/20/99)

The Contractor may be required to install and maintain temporary reflective tape striping as directed by the ACHD Traffic Engineer during all phases of construction until the permanent traffic stripes and pavement markings can be installed. The cost of providing, installing, maintaining, and removing temporary striping shall be incidental to other items of work.

Temporary striping shall be removed after the ACHD Traffic Engineer has determined it is no longer required.

1134.09 — DELINEATORS

(Revised 06/03/05)

A. Materials

Delineators shall be **FlexStake Highway Delineator HD 600 Series** or an ACHD approved equal and shall be 6 feet long unless otherwise shown on the plans. The color of the delineator shall be the same as the adjacent edgeline, unless otherwise directed by the ACHD Traffic Engineer.

B. Installation

All delineators shall be installed in compliance with the manufacturer's recommendations.

Delineators shall be installed in the locations shown on the project Plans, unless otherwise directed by the ACHD Traffic Engineer.

All delineator installations shall comply with the requirements of the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).

Delineators shall be installed in such a manner that the top of the reflector is 4 feet above the adjacent roadway edge. They shall be placed between 2 feet and 6 feet outside the outer edge of the shoulder, or if appropriate, in line with the guardrail post. The face of the reflector shall be perpendicular to the line of oncoming traffic, unless otherwise directed by the ACHD Traffic Engineer.

Delineator spacing should be adjusted on approaches to and throughout horizontal curves so that several delineators are always visible to the motorist. On short radius curves it is necessary to orient the delineator several degrees toward the roadway so that it is perpendicular to the line of oncoming traffic.

Where normal uniform spacing is interrupted by driveways, intersections, etc., delineators may be moved a distance not exceeding 25% of the normal spacing. If this distance does not move the delineator to an acceptable location, then the delineator shall be eliminated.

1134.10 —SURFACE MOUNT CHANNELIZERS

(Typically Supplied by ACHD) (Revised 11/04/11)

A. Materials

Contractor shall coordinate channelizer pickup with the ACHD Traffic Operations Supervisor a minimum of three weeks in advance. The surface mount channelizers shall be manufactured by **Pexco (Davidson Traffic Control Products, Flexi-Guide 300)** or an approved ACHD equal.

B. Installation

All channelizers shall be installed in compliance with the manufacturer's recommendations.

Channelizers shall be installed in the locations shown on the Plans, unless otherwise directed by the ACHD Traffic Engineer. All channelizer installations shall comply with the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)**.

1134.11 — MEASUREMENT AND PAYMENT

(Revised 05/20/99)

A. Measurement

Traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two 4 inch wide solid yellow stripes or a 4 inch wide solid yellow stripe and a 4 inch wide yellow skip stripe, will be measured as one traffic stripe. Striped medians and two-way left turn lanes consist of two double traffic stripes and therefore shall be measured as two traffic stripes. A traffic stripe that consists of two coats of paint shall be measured as one traffic stripe.

Pavement markings (e.g. stop bars, crosswalks, symbols, arrows and word markings) will be measured by the square foot for the actual area covered. Quantities of delineators to be paid for will be determined as units from actual count in place. Quantities of channelizers to be paid for will be determined as units from actual count in place.

B. Payment

The unit contract prices for the bid items listed below shall be full compensation for furnishing all labor, tools, materials, and equipment necessary or incidental for the completion of the work as herein specified. All traffic stripes, pavement markings, channelizers and delineators shall comply with the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)** and these Supplemental Provisions (see ACHD Standard Details TS-1112 & TS-1113).

Payment shall be made for the following bid items:

<u>Ref.</u>	<u>Bid Item</u>	<u>Unit</u>
1134.03.01	Striping Detail #1 (Paint)	.linear foot (LF)
1134.03.02	Striping Detail #2 (Paint)	.linear foot (LF)
1134.03.03	Striping Detail #3 (Paint)	.linear foot (LF)
1134.03.04	Striping Detail #4 (Paint)	.linear foot (LF)
1134.03.05	Striping Detail #5 (Paint)	.linear foot (LF)
1134.03.06	Striping Detail #6 (Paint)	.linear foot (LF)
1134.03.07	Striping Detail #7 (Paint)	.linear foot (LF)
1134.03.08	Striping Detail #8 (Paint)	. linear foot (LF)
1134.03.09	Striping Detail #9 (Paint)	.linear foot (LF)
1134.03.10	Striping Detail #10 (Paint)	.linear foot (LF)
1134.03.11	Striping Detail #11 (Paint)	.linear foot (LF)
1134.03.12	Striping Detail #12 (Paint)	.linear foot (LF)
1134.03.13	Striping Detail #13 (Paint)	.linear foot (LF)
1134.03.14	Striping Detail #14 (Paint)	linear foot (LF)
1134.03.15	Striping Detail #15 (Paint)	.linear foot (LF)
1134.03.16	Striping Detail #16 (Paint)	. linear foot (LF)
1134.03.17	Striping Detail #17 (Paint)	.linear foot (LF)
1134.03.18	Pavement Markings (Paint)	
1134.04.01	Striping Detail #1 (Tape)	.linear foot (LF)
1134.04.02	Striping Detail #2 (Tape)	.linear foot (LF)
1134.04.03	Striping Detail #3 (Tape)	.linear foot (LF)
1134.04.04	Striping Detail #4 (Tape)	.linear foot (LF)
1134.04.05	Striping Detail #5 (Tape)	.linear foot (LF)
1134.04.06	Striping Detail #6 (Tape)	.linear foot (LF)
1134.04.07	Striping Detail #7 (Tape)	.linear foot (LF)
1134.04.08	Striping Detail #8 (Tape)	.linear foot (LF)
1134.04.09	Striping Detail #9 (Tape)	.linear foot (LF)
1134.04.10	Striping Detail #10 (Tape)	.linear foot (LF)
1134.04.11	Striping Detail #11 (Tape)	.linear foot (LF)
1134.04.12	Striping Detail #12 (Tape)	.linear foot (LF)
1134.04.13	Striping Detail #13 (Tape)	. linear foot (LF)
1134.04.14	Striping Detail #14 (Tape)	.linear foot (LF)
1134.04.15	Striping Detail #15 (Tape)	. linear foot (LF)
1134.04.16	Striping Detail #16 (Tape)	
1134.04.17	Striping Detail #17 (Tape)	. linear foot (LF)
1134.04.18	Pavement Markings (Tape)	square foot (SF)
1134.05.18	Pavement Markings (Thermoplastic)	square foot (SF)
1134.06.18	Pavement Markings (Epoxy)	
1134.09.01	Delineators (White)	
1134.09.02	Delineators (Yellow)	
1134.10.01	Channelizers (White)	
113// 10 02	Channelizers (Vollow)	each (FA)

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1135.01 — DESCRIPTION

(Revised 06/03/05)

This item shall include all costs associated with installing roadside traffic signs of the type, size, and at the locations shown on the Plans. The Contractor shall coordinate pick up of ACHD supplied materials (when applicable) with the ACHD Traffic Operations Supervisor a minimum of three weeks in advance.

The signs, posts, and all hardware shall conform to the details on the Plans and these Supplemental Provisions (see ACHD Standard Detail TS-1114)

All signs shall comply with the most recent version of the **Manual on Uniform Traffic Control Devices (MUTCD)**.

1135.02 — MATERIALS

(Revised 06/03/05)

The materials listed below are the materials typically used for roadside sign installations. Any materials required for a roadside sign installation not listed below shall be supplied by the Contractor. The cost of any such material shall be incidental to the cost of the sign installation and no further compensation shall be made therefore.

A. Sign Blanks

Flat sign blanks for signs with areas less than or equal to 9 square feet shall be .080 inch tempered aluminum alloy.

B. Sign Blank Covering (type and coloring)

- 1. Background color for *public street name signs* shall be green with engineering grade sheeting on the copy side.
- 2. Background color for *private street name signs* shall be blue with engineering grade sheeting on the copy side.
- Colors for stop and yield signs shall comply with the Manual on Uniform Traffic Control Devices (MUTCD). These signs shall have high intensity retroreflective sheeting on the copy side.
- 4. Colors for all school related warning signs shall be fluorescent yellow-green and shall comply with the Manual on Uniform Traffic Control Devices (MUTCD). These signs shall have diamond grade retroreflective sheeting on the copy side. Sheeting shall be manufactured by 3M Company or approved equal.
- 5. Colors for *all other signs* shall comply with the most recent update to the **Manual on Uniform Traffic Control Devices (MUTCD)**. These signs shall have engineering grade

retroreflective sheeting on the copy side, unless otherwise directed by the ACHD Traffic Engineer.

C. Lettering (type, size, and other requirements)

- 1. All lettering for street name signs shall be made of engineering grade sheeting.
- 2. Main legend lettering for *public* street name signs shall be 6 inch series "B" Highway Gothic with appropriate spacing. The main legend lettering on street name signs installed on roadways with four or more lanes may be increased to 8 inches at the discretion of the ACHD Traffic Engineer. Letters larger than 6 inches may also be used for short street names (6 letters or less) if approved by the ACHD Traffic Engineer.
- 3. Directional prefixes for *public* street name signs shall be 3 inch series "C" Highway Gothic followed by a period.
- 4. Street designation suffixes for *public* street name signs shall be 3 inch series "B" Highway Gothic.
- 5. Main legend lettering for private street name signs shall be 4 inch series "B" Highway Gothic with appropriate spacing.
- 6. Directional prefixes for private street name signs shall be 3 inch series "C" Highway Gothic followed by a period.
- 7. Street designation suffixes for private street name signs shall be 3 inch series "B" Highway Gothic.
- 8. The text for the word "PRIVATE" on private street name signs shall be 2 inch series "C" Highway Gothic.
- 9. Letters and symbols for all other signs shall comply with the Manual on Uniform Traffic Control Devices (MUTCD).

D. Sign Sizes

All sign shapes and colors shall comply with the **Manual on Uniform Traffic Control Devices** (MUTCD).

1. Stop Signs

(Typically Supplied by ACHD)

Stop signs shall be a <u>minimum</u> of 30 inches by 30 inches and shall be covered with high intensity grade retroreflective sheeting. Actual size shall be as shown on the Plans, unless otherwise specified by the ACHD Traffic Engineer.

2. Yield Signs

(Typically Supplied by ACHD)

Yield signs shall be a <u>minimum</u> of 36 inches from point to point and shall be covered with high intensity grade retroreflective sheeting. Actual size shall be as shown on the Plans, unless otherwise specified by the ACHD Traffic Engineer.

3. Street Name Signs

(Typically Supplied by ACHD)

Street name signs shall be 9 inches high by the length required to fit the text. The <u>maximum</u> allowed length is 48 inches.

4. All Other Signs - Less Than or Equal to 9 SF

(Typically Supplied by ACHD)

All Regulatory, Guide and Warning signs shall be "Standard" size as specified in the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)**, unless otherwise specified herein, shown on the Plans or specified by the ACHD Traffic Engineer.

5. All Other Signs - Greater Than 9 SF

(Supplied by Contractor)

All Regulatory, Guide and Warning signs shall be "Standard" size as specified in the most recent edition of the **Manual on Uniform Traffic Control Devices (MUTCD)**, unless otherwise specified herein, shown on the Plans or specified by the ACHD Traffic Engineer.

The project plans should include details showing sign materials, sign thickness, text sizes and sign layout. If the project plans do not include this information, then the Contractor shall provide shop drawings for all signs greater than 9 square feet that are to be furnished by the Contractor. Shop drawings shall include materials, sign thickness, text size and sign layout. Signs furnished by the Contractor shall not be installed until the shop drawings have been approved by the ACHD Traffic Engineer. The ACHD Traffic Engineer will require ten business days to review shop drawings.

E. Sign Posts

6. Metal Sign Support Upright - 2 Inch by 2 Inch

(Typically Supplied by ACHD)

Square tubing used for the sign support upright shall be 14 gauge galvanized steel of structural quality, **ASTM Spec. No. A570**, Grade 33, 2 inches by 2 inches by 12 feet in length. The sign post shall have 3/8 inch diameter perforations on one inch centers for the full length of the upright, on all four sides.

One metal post may support a maximum of one primary sign (less than or equal to 9 square feet) and one secondary sign (less than or equal to 4 square feet).

Two metal posts may support a maximum of one primary sign (less than or equal to 16 square feet) and two secondary signs (less than or equal to 4 square feet each).

7. Metal Sign Base

(Typically Supplied by ACHD)

Square tubing used for the sign base shall be 12 gauge galvanized steel, 2-1/4 inches by 2-1/4 inches by 30 inches in length. The sign base shall have 3/8 inch diameter holes on 1 inch centers for the full length of the base, on all four sides.

8. Wood Sign Post

(Supplied by Contractor)

Wood sign posts shall be furnished by the Contractor. The cost of the wood post shall be incidental to the cost of the sign installation. The project plans should include details showing material type, length of post, cross sectional area of post and installation details. If the project plans do not include this information, than the Contractor shall submit shop drawings for the wood sign post installations. Shop drawings shall include material type, length of post, cross sectional area of post and installation details. Unless approved by the ACHD Traffic Engineer, the design shall be performed by an engineer registered in the State of Idaho. Sign post design shall comply with the latest edition of the **AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.** All wood posts shall be crashworthy in accordance with NCHRP Report Number 350. If shop drawings are required, then the Contractor shall not begin installation of wood posts until the shop drawings have been approved by the ACHD Traffic Engineer. The ACHD Traffic Engineer will require ten business days to review the shop drawings.

Wood posts that are 4 inches by 4 inches in size, shall be constructed of select heart grade redwood; No. 1 heart structural grade redwood; No. 2 heart structural grade redwood; light framing construction grade Douglas fir, free of heart center; or structural light framing No. 1 grade Hem-Fir, free of heart center. Wood posts that are 4 inches by 6 inches in size, shall be constructed of select heart grade redwood; select heart structural grade redwood; No. 1 heart structural grade redwood; structural joists and planks, No. 2 grade Douglas fir, free of heart center; or structural joists and planks, No. 1 grade Hem-Fir, free of heart center. Posts larger than 4 inches by 6 inches in size shall be constructed of select heart grade redwood; No. 1 heart structural grade redwood; posts and timbers No. 1 (structural) grade Douglas fir, free of heart center; or posts and timbers select structural grade Hem-Fir, free of heart center.

Sweep shall not exceed .08 foot in 10 feet. Before preservative treatment, Douglas fir and Hem-Fir posts shall be seasoned to a moisture content of not more than 25% as measured at the midpoint of the post in the outer inch, using an approved type of moisture meter, in accordance with ASTM Designation D 4444.

Sign posts shall be pressure treated with pentachlorophenol in AWPA P-9 oil, chromated copper arsenate, or ammoniacal copper zinc arsenate in accordance with the requirements of the American Wood Preservers Association Standards (AWPA) C-14 and P-5, except that the minimum retention of preservative as determined by assay shall be 0.4 pound of

ammoniacal copper zinc arsenate, chromated copper arsenate, or net pentachlorophenol per cubic foot of wood.

Sign posts treated with waterborne preservatives shall be air dried a minimum of thirty days prior to installation. During the period of September 1 through May 31, the air drying shall be under cover. During the 30-day drying period, each layer of posts shall be separated using spacers that are at least 1/2 inch thick.

Treated posts and blocks shall be subject to inspection by the Engineer after arrival at the site. A previous inspection at the plant shall not bar rejection.

Certified treating reports shall be furnished for all treated timber products to be shipped. A certificate of compliance shall be furnished to ACHD stating the species of the material and that it conforms to the specified grading rules.

Handling and care of pressure treated timber products shall conform to the requirements of AWPA Standard M4.

The treating plant shall imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standards M1 and M6.

At the time of delivery to the job site, all treated posts shall have a moisture content of not more than 25% when tested as described above. The posts shall conform in all respects to the specified grading requirements at the time of delivery to the job site.

The cutting of the ends of wood posts in the field will be permitted. Where field cutting or boring of wood posts is performed after treatment, all cuts and holes shall be thoroughly swabbed, sprayed or brushed with two applications of the same type of preservative as initially used or copper naphthenate. Application of preservative in the field shall conform to the requirements specified herein.

Wood block spacers, inserted between the post and the sign panel on single post installations as shown on the plans, shall be treated with preservative in the same manner as specified for wood posts.

Unless specified in the special provisions or shown on the plans, wood posts and blocks shall not be painted.

F. Mounting Hardware

(Typically Supplied by ACHD)

The following mounting hardware is typically supplied by ACHD:

- 1. 5/16 inch Vandalguard [™] carriage bolts and vandal proof nuts or an ACHD approved equal.
- 2. Vandal-proof drive rivets.

Any other mounting hardware required for construction shall be supplied by the Contractor. The cost of furnishing additional hardware shall be incidental to the cost of the sign installation.

1135.03 — GENERAL INSTALLATION REQUIREMENTS

(Revised 06/03/05)

- 1. All signs to be installed shall be located in conformance with the guidelines set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).
- 2. Height of the signs shall be a <u>minimum</u> distance of seven feet from the pavement or sidewalk, if sidewalk exists, to the bottom edge of the sign. If additional signs are added to the bottom of the pole, the height from the pavement to bottom of the lowest sign shall be a <u>minimum</u> distance of six feet. On rural roadway sections, when conditions exist that make the seven foot mounting height impractical, a five foot mounting height is acceptable.
- 3. On urban roadway sections, the side clearance between the face of curb and the edge of sign shall be a <u>minimum</u> of two feet. On rural roadway sections, the side clearance between the edge of roadway and the edge of sign shall be a <u>minimum</u> of six feet.
- 4. Signs shall be installed and covered prior to revisions or additions to the roadway channelization. ACHD will authorize uncovering of the signs. When new signs are uncovered, ACHD may require warning flags to highlight new signs. Warning flags shall be provided by ACHD. Installation of the warning flags shall be incidental to the sign installation and no additional compensation will be made therefore.
- 5. All existing signs that conflict with the new signs being installed shall be removed at the appropriate time, as determined by ACHD, and delivered to the ACHD Traffic Operations Sign Shop. If the conflicting signs are not shown on the plan, then verify the removal with the ACHD. The ACHD Traffic Operations Sign Shop is located at:

3700 Adams St. Garden City, ID 83714

All deliveries shall be coordinated with the Traffic Operations Supervisor at least two business days prior to delivery.

6. Any sign damaged or destroyed due to the Contractor's negligence shall be replaced by the Contractor at no cost to ACHD.

1135.04 — REMOVE AND SALVAGE ROADSIDE SIGN

(Revised 06/03/05)

All existing traffic signs, posts and related hardware to be removed and salvaged shall remain the property of ACHD.

Contractor shall remove and salvage traffic signs, poles and related hardware as shown on the Plans or as directed by the ACHD Traffic Engineer. All sign removals shall be done at the appropriate time as determined by the ACHD Traffic Engineer or the ACHD Resident Project Representative. Regulatory signs (stop, yield, speed limit, etc) shall remain in operation the length of the project unless specifically mentioned otherwise in the plans.

Signs may need to be relocated one or more times before final removal. All costs associated with these relocations shall be incidental to other items in the contract.

Removed signs, poles and hardware shall be delivered to the ACHD Traffic Operations Sign Shop. The ACHD Traffic Operations Sign Shop is located at:

3700 Adams St. Garden City, ID 83714

All deliveries shall be coordinated with the ACHD Traffic Operations Supervisor a minimum of two days in advance.

Signs shall be carefully removed to prevent damage. Any sign damaged or destroyed due to the Contractor's negligence shall be replaced by the Contractor at no cost to ACHD.

Payment for removal and salvage of roadside signs shall be as provided in the contract documents. If the contract documents do not provide a specific bid item for removal and salvage of roadside signs, then removal and salvage of roadside signs shall be incidental to other items in the contract.

1135.05 — RELOCATE ROADSIDE SIGN

(Revised 05/20/99)

All signs, poles and related hardware shown on the plans to be relocated shall be removed and delivered to the ACHD Traffic Operations Sign Shop. The ACHD Sign Crew Chief shall inspect the condition of the sign, pole and related hardware. If the sign, pole and hardware are in an acceptable condition, they shall be reissued. Any sign, pole or related hardware that is not in an acceptable condition shall be replaced by ACHD. If ACHD determines that a sign is not in an acceptable condition and does not have the replacement sign in stock, then ACHD will either make or purchase a new replacement sign. Replacement signs should be provided to the Contractor within three weeks of sign inspection.

All sign removals shall be done at the appropriate time as determined by the ACHD Traffic Engineer or the ACHD Resident Project Representative.

Signs may need to be relocated one or more times before final relocation or removal. All costs associated with these relocations shall be incidental to other items in the contract.

The ACHD Traffic Operations Sign Shop is located at:

3700 Adams St. Garden City, ID 83714

All deliveries shall be coordinated with the ACHD Traffic Operations Supervisor a minimum of two days in advance.

Signs shall be carefully removed to prevent damage. Any sign damaged or destroyed due to the Contractor's negligence shall be replaced by the Contractor at no cost to ACHD.

Sign removal shall be paid for as provided in the contract documents. If the contract documents do not provide a specific bid item for removal and salvage of roadside signs, then removal and salvage of roadside signs shall be incidental to other items in the contract. Sign installation shall be paid for as provided herein.

1135.06 — MEASUREMENT AND PAYMENT

(Revised 06/03/05)

A. Measurement

1. Roadside Traffic Sign Installation (Single Metal Post)

Roadside sign installations with one metal post shall be measured by the unit from actual count. One or more sign panels mounted on a single post installation will be counted as one single post roadside sign installation.

2. Roadside Traffic Sign Installation (Two Metal Posts)

Roadside sign installations with two metal posts shall be measured by the unit from actual count. One or more sign panels mounted on a two post installation will be counted as one two post roadside sign installation.

3. Roadside Traffic Sign Installation (Single Wood Post)

Roadside sign installations with one wood post shall be measured by the unit from actual count. One or more sign panels mounted on a one post installation will be counted as one single post roadside sign installation.

4. Roadside Traffic Sign Installation (Two Wood Posts)

Roadside sign installations with two wood posts shall be measured by the unit from actual count. One or more sign panels mounted on a two post installation will be counted as one two post roadside sign installation.

5. Furnish Roadside Sign Face

Roadside sign faces shall be measured by the square foot for the actual area of sign sheeting attached to sign blanks provided by the Contractor. Contractor shall only be paid for sign faces that have been installed.

6. Remove and Salvage Roadside Sign

Roadside sign removal and salvage shall be measured by the unit from actual count. One or more sign panels mounted on a post will be counted as one single roadside sign removal and salvage.

7. Relocate Roadside Sign

Roadside sign relocation shall be measured by the unit from actual count. One or more sign panels mounted on a post will be counted as one single roadside sign relocation.

B. Payment

The unit contract prices for the bid items listed below shall be considered full compensation for furnishing all labor, tools, materials and equipment necessary or incidental for the completion of the work as shown on the Plans and these Supplemental Provisions. All signs shall comply with the latest edition of the **Manual on Uniform Traffic Control Devices (MUTCD)** and these Supplemental Provisions (see ACHD Standard Detail TS-1114). Payment shall be made for the following bid items:

<u>Ref.</u>	Bid Item	<u>Unit</u>
1135.01.01	Roadside Traffic Sign Installation (one metal post)	each (EA)
1135.01.02	Roadside Traffic Sign Installation (two metal posts)	each (EA)
1135.01.03	Roadside Traffic Sign Installation (one wood posts)	each (EA)
1135.01.04	Roadside Traffic Sign Installation (two wood posts)	each (EA)
1135.01.05	Furnish Roadside Sign Face	square foot (SF)
1135.01.06	Remove and Salvage Roadside Sign	each (EA)
1135.01.07	Relocate Roadside Sign	each (EA)

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- A. Description
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1150.02 - CLOSED CIRCUIT TEVLEVISION (CCTV) DOME SYSTEM

- 1. General Information
- 2. System Description

1150.04 - ETHERNET SWITCH

A. General Specifications

1150.01 — GENERAL REQUIREMENTS

(Revised 01/19/12)

The work to be performed shall consist of the installation of a complete and operable Intelligent Transportation System.

The Contractor shall install all ITS devices, (cameras, camera assemblies, camera poles, fiber communication systems, foundations, vehicle detection systems) and other incidental materials as required to comply with the plans and these Supplemental Provisions. All materials necessary for the complete installation shall be furnished by the Contractor with the exception of materials explicitly noted to be furnished by ACHD or other agencies. Contractor shall contact the ACHD Traffic Operations Supervisor a minimum of 30 days in advance to schedule a pickup of items supplied by ACHD. Contractor shall verify pick up time, date and location a minimum of two business days in advance of pick up.

The materials to be incorporated in the installation of ITS systems shall be listed in the bid package.

1150.02 — CLOSED CIRCUIT TELEVISION (CCTV) DOME SYSTEM

(Revised 11/30/11)

1.1 General Information

Closed Circuit Television (CCTV) cameras used on the ACHD system shall be color outdoor Ethernet/IP based AutoDome 700 Series, Model VG5-724-ECE2, PTZ camera system manufactured by:

Bosch Security Systems, Inc. 130 Perinton Parkway Fairport, New York, 1450, USA Phone: + 1 800 289 0096 Fax: + 1 585 223 9180 security.sales@us.bosch.com www.boschsecurity.us]

1.2 System Description

A. Performance Requirements

- A day/night high-resolution CCD dome PTZ camera that offers 550 TVL, 12x digital zoom, and wide dynamic range.
- Progressive scan technology.
- Sodium Vapor White Balance mode.
- Quad video streaming generates simultaneous H.264, M-JPEG, and JPEG video streams
- ONVIF conformant; provides interoperability with other conformant systems
- National Transportation Communications for ITS Protocol (NTCIP) conformant
- Embedded Intelligent Video Analytics (IVA) for reliable detection, tracking, analysis, and search capabilities
- High-impact, heavy-duty, tamper resistant aluminum housing with the protection of a rugged bubble
- High-speed 360-degree continuous pan
- Preset tour and AutoPan modes
- Provide 24 hour security with detail images day or night.
- Possess advanced intelligence features.
- Features mast, and pole mount options.

B. General Characteristics:

The day/night IP PTZ camera shall offer a 36x 1/4-in. Exview HAD CCD camera with 12x digital zoom.

The day/night IP PTZ camera shall offer wide dynamic range technology that allows for the capture of clear from both light and dark areas in the same scene.

The day/night IP PTZ camera shall offer progressive scan technology that allows for the capture of clear images from a moving camera.

The day/night IP PTZ camera shall feature a Sodium Vapor White Balance mode for taking images under a street lamp or tunnel lamp.

The day/night IP PTZ camera shall provide direct network connection using H.264 and M-JPEG compression and bandwidth throttling to efficiently manage bandwidth and storage requirements while delivering outstanding image quality.

The day/night IP PTZ camera shall offer embedded Intelligent Video Analysis (IVA) that eliminates dedicated PCs and associated software maintenance.

The day/night IP PTZ camera shall support the following tour modes:

(99) user-defined pre-positions with 20-character titles.

One (1) preset tour capable of 99 pre-positions and a configurable dwell time between positions.

One (1) AutoPan mode.

The day/night IP PTZ camera shall provide pan and tilt preset repeatability accurate to within ±0.1 degrees.

The day/night IP PTZ camera shall provide the following variable pan/tilt speeds

- A range of 0.1 degrees per second to 120 degrees per second.
- A pan speed of 360 degrees per second between prepositions
- A tilt speed of 100 degrees per second between prepositions.

The day/night IP PTZ camera shall provide a pan range of 360 degrees of continuous rotation.

The day/night IP PTZ camera shall provide the patented Bosch AutoScaling (proportional zoom) and AutoPivot features.

The day/night IP PTZ camera shall provide 16 independent sectors with 20-character titles/sector.

The day/night IP PTZ camera shall provide 24 individual privacy masks with the following features:

- Shapes shall be defined with four corners.
- The mask shall be gray.

The day/night IP PTZ camera shall offer an optional fiber optic media converter kit. The day/night IP PTZ camera shall be able to be mounted to a wall, mounted to a surface or mounted to a pipe.

The day/night IP PTZ camera shall offer IP66 environmental protection for pendant models.

The day/night IP PTZ camera shall support the following languages:

• English

The day/night IP PTZ camera dome bubble shall:

- Meet flame, crush, and impact resistant requirements able to exceed UL 746C standard for polymeric material enclosures.
- [Be a high-resolution bubble made of acrylic]
- [Be an impact-resistant bubble made of 2.6 mm thick polycarbonate able to withstand a 100 foot-pound impact or the equivalent of a 10 lb sledgehammer dropped from a height of 10 feet.]
- Offer a clear version.

C. Basic Features:

The day/night IP PTZ camera shall provide a feature that automatically rotates, or pivots, the camera to simplify tracking of a person walking directly under the camera.

The day/night IP PTZ camera shall provide advanced troubleshooting and diagnostics via diagnostic LEDs and on-screen diagnostic displays.

The day/night IP PTZ camera shall allow an optional integral fiber optic media converter transceiver module, capable of transmitting and receiving video and Biphase signals up to 60 km (37 miles).

The day/night IP PTZ camera shall be compatible with the Bosch Video Client and the Bosch Video Recording Manager.

D. IP Connectivity

The day/night IP PTZ camera shall allow full camera control and configuration capabilities over the network.

The day/night IP PTZ camera shall be capable of capturing and storing images using H.264 compression.

The day/night IP PTZ camera shall deliver the following simultaneous streams:

• Two (2) individually configurable H.264 streams.

- One (1) H.264 I-frame only stream.
- One (1) M-JPEG stream.

The day/night IP PTZ camera shall deliver DVD-quality video, at rates up to 30 images per second, via TCP/IP over Cat5/Cat6 UTP cable.

The day/night IP PTZ camera shall support iSCSI devices to allow the network-enabled camera to stream video directly to an iSCSI RAID array.

The day/night IP PTZ camera shall conform to the ONVIF standard.

The day/night IP PTZ camera shall conform to the NTCIP 1205 protocol.

The day/night IP PTZ camera shall offer embedded Intelligent Video Analysis (IVA) that eliminates dedicated PCs and associated software maintenance.

E. Intelligent Video Analysis

The day/night IP PTZ camera shall be capable of processing and analyzing video within the camera itself, with no extra hardware required.

The day/night IP PTZ camera shall be capable of detecting and sending alarms for abnormal events.

The day/night IP PTZ camera shall be configurable to analyze up to 10 different scenes for one or more of the following events: Line Crossing, Loitering, Idle Object, Removed Object, Conditional Change, Trajectory Tracking, and Filters.

The day/night IP PTZ camera shall allow users to set up to 10 separate profiles and switch profiles based on a day/night or holiday schedules.

The day/night IP PTZ camera shall support scene tours that automatically reposition the camera to each scene for a specified duration.

The day/night IP PTZ camera shall incorporate an Alarm Rule Engine, enabling abnormal events that IVA detects to prompt the camera to take one or more actions such as:

- Trigger a relay connected to an alarm siren and/or strobe
- Trigger a visual alert to be displayed on the operator's screen
- Go to a specified scene (preset position)

F. Advanced Features

The day/night IP PTZ camera shall provide fast 360° per second pan speed and 100° per second tilt speed.

The day/night IP PTZ camera shall divide the cameras 360° rotation into 16 independent sectors with 20-character titles per sector. Any or all of the 16 sectors can be blanked from the operator's view.

The day/night IP PTZ camera shall offer the ability to define 24 masks with up to 8 masks per scene that prohibit areas of the field of view from being seen even if the camera is panned, tilted, or zoomed.

The day/night IP PTZ camera shall have a preset tour function.

The day/night IP PTZ camera shall store up to 99 preset scenes with each preset programmable for 20 character titles.

The day/night IP PTZ shall offer one preset tour to display consecutively the preset scenes for a programmed dwell time. Any or all of the presets can be included or excluded from the tour.

The day/night IP PTZ camera shall execute one of the following programmable options when an operator stops manual control of the camera, and a programmed period of time is allowed to expire: return to a stored preset number, return to the automated tour previously executed, and do nothing.

G. Alarm Handling

The day/night PTZ camera shall provide advanced alarm handling to manage up to two (2) alarm inputs and one (1) alarm output by means of a programmable "Rules" engine.

The day/night PTZ camera shall allow any or all of the input contacts to be programmed upon activation to automatically move the camera to any preposition location, close an output relay for a programmed period of time, transmit an alarm signal (via Bilinx) and display an alarm indication on the on-screen display of the monitor.

H. Image Processing

The day/night IP PTZ camera shall provide image stabilization using a dedicated digital signal processor (DSP) to minimize camera shake on both the horizontal and vertical axes while maintaining a clear image as the zoom range increases. The image stabilization algorithms do not reduce camera sensitivity.

The day/night IP PTZ camera shall provide an AutoPivot feature to automatically rotate and flip the camera as it tilts through the vertical position to maintain the correct orientation of the image.

The day/night IP PTZ camera shall provide an AutoScaling feature that reduces the pan/tilt speed as the camera zooms in on an object, so that the relative speed on the screen remains constant.

I. Camera Options

The 36x day/night camera shall consist of an integrated high resolution Exview HAD CCD camera using a 1/4-inch imager.

The 36x day/night camera shall offer the following effective picture elements:

- 1) PAL: Approx. 440,000; 752(H) x 582(V)
- 2) NTSC: Approx. 380,000; 768 (H) x 494 (V)

The 36x day/night camera shall offer a 36x (3.4 - 122.4 mm, F1.6 to F4.5) auto-iris, auto-focus optical zoom lens with manual override. It will have a variable high speed, 360° pan/tilt drive with a top speed of 120° per second.

The 36x day/night camera shall be designed to perform over a wide range of environmental and lighting conditions with a horizontal resolution of 550 TVL (NTSC/PAL) typical.

The 36x day/night camera shall offer sensitivity down to 0.04 lux in day mode, and 0.0052 lux in night mode.

The 36x day/night camera shall switch automatically from daylight color operation to a higher sensitivity nighttime monochrome mode when light levels fall below an adjustable threshold level. Day/night operation may also be manually switched on or off from the system switcher/controller keyboard.

The 36x day/night camera shall possess a full 12x digital zoom that is functional once the maximum 36x optical zoom limit has been reached. The 12x digital zoom lens is on/off selectable from the system controller keyboard.

The 36x day/night camera shall have a Freeze Frame feature that holds a preposition shot while moving to another preposition.

The 36x day/night camera shall offer color correction for images lit with a sodium vapor lamp.

The 36x day/night camera shall conform to the following specifications:

Electronic Shutter Speed (AES).... 1 to 1/10,000 sec

Lens:...... 3.4 mm to 122.4 mm (F1.6 to F4.5)

Optical Zoom...... 36x
Digital Zoom...... 12x

Video Output:..... 1.0 Vp-p, 75 ohms

Synchronization:..... Line-lock (-120° to 120° vertical phase adjust) or

internal crystal

Signal to Noise Ratio......Greater than 50 dB White Balance.....2,000 K to 10,000 K

J. Housing Options

The day/night IP PTZ camera shall be enclosed in an Outdoor Pendant.

The day/night IP PTZ camera housings shall come standard with recessed setscrews and a recessed bubble latch for increased tamper resistance.

The day/night IP PTZ camera shall provide built-in surge protection for power, data, and video and alarm inputs.

The Outdoor pendant housing shall:

Use a hinge, in-place of a tether, to make installation easier and safer. dome with an attached sunshield.

Allow camera to view 18º above the horizon.

Conform to IP66 and NEMA 4X standards for a rugged and weather-resistant package.

Be made of cast aluminum for corrosion resistance, and supplied with a built-in heater/blower to provide an operating temperature range down to -40° C to 50° C (-40° F to 122° F).

Use a low-impact, high-resolution acrylic bubble.

Allow removal of the sunshield for conversion to an indoor unit.

K. Mechanical

Pan Range: 360° continuous

Tilt Angle:

Outdoor Pendant: <u>18° above horizon</u>

Variable Speed: 0.1°/s to 120°/s

Pre-position Speed:Pan: 360°/sTilt: 100°/s

Preset Accuracy: ± 0.1° typ.

L. Electrical

Rated Voltage:

- Camera input voltage/power requirements: 21 30 VAC, 50/60 Hz
- Heater input voltage/power requirements: 21 30 VAC, 50/60 Hz

Power Draw (typical):

Outdoor Pendant: 55 W / 60 VA

Surge Suppression (Protection)

- Video: Peak current 10kA (Gas Tube Arrester), peak power 1000 W (10/1000μs)
- Power Input (Dome): Peak current 7.3 A, peak power 600 W (10/1000μs)
- Alarm Inputs: Peak current 17 A, peak power 300 W (8/20μs)
- Alarm Outputs: Peak current 2 A, peak power 300 W (8/20µs)
- Relay Outputs: Peak current 7.3 A, peak power 600 W (10/1000μs)

M. Network

Standards: H.264 (ISO/IEC 14496□10), M□JPEG, JPEG

Streaming: Multiple individually configurable streams in H.264 and JPEG, configurable

frame rate and bandwidth: GOP Structure: IP, IBP, IBBP Data Rate: 9.6 kbps to 6 Mbps Overall IP delay: 240 ms Resolution (PAL/NTSC)

4CIF/D1: 704 x 576/480 (25/30 ips)

• CIF: 352 x 288/240 (25/30 ips)

Frame Rate: 25/30 ips (PAL/NTSC)

Ethernet: 10-Base T/100 Base-TX, auto-sensing, half/full duplex, RJ45

Protocols: RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP, SNMP 3, RTSP, 802.1x, iSCSI, DynDNS, UPnP, IP v4/6, QoS, SSH, SSL

NTCIP Protocol:

- CCTV Camera Control: NTCIP 1205
- Application Layer: SNMP per NTCIP 1101:1996 & NTCIP 2301
- Transport/Network Layer: TCP/IP per NTCIP 2202:2001
- Sub-network Layer: PMPP per NTCIP 2101:2001 & NTCIP 2102:2003

Audio

Standard:

G.711, 8 kHz sampling rate L16, 16 kHz sampling rate

Signal-to-Noise Ratio: Greater than 50 dB Steaming: Full Duplex / Half Duplex

N. Miscellaneous

Sectors/Titling: 16 independent sectors with a 20-character title/sector

Masking: 24 individually configurable privacy masks Pre-positions: 99, each with a 20-character title

Preset Tours: One (1), consisting of 99 scenes, consecutively

Supported Language: English

O. User Connections

Power

Camera, all models: 21-30 VAC, 50/60 Hz

Heater, outdoor pendant: 21-30 VAC, 50/60 Hz

Video and Control: RJ-45 100 Base-TX Ethernet

Alarm Input (2): NC/NO

Alarm Output: Open collector NPN, 32 VDC @ 150 mA, maximum

Audio Input Line Level (one way audio)

Input Voltage: 5.5 Vp-p max

• Impedance: 9 Kohm typical

P. Environmental

Design Rating

IP66, NEMA 4X

Operating Temperature:

• -40° to 50°C (-40° to 122°F)]

Storage Temperature, all models: -40° to 60°C (-40° to 140°F)]

Operating Humidity:

• 0% to 100% relative, non-condensing]

Q. Construction

Weight

• 3.03 kg (6.68 lb)

Construction Material

Housing: Cast aluminum

Bubble: [Pendants: Acrylic (high-resolution)]

Bubble Size: 153.1 mm (6.03 in.) Standard Color: White (RAL9003)

1.3 Accessories

Bubbles

Pendant

Bosch VGA-BUBBLE-PCLR Clear rugged polycarbonate Bosch VGA-BUBBLE-PCLA Clear high-resolution acrylic

Mounts

Bosch VG4-A-9543 Pipe mount, white

Bosch VGA-PEND-ARM Pendant arm without power supply box, white Bosch VG4-A-TSKIRT Trim skirt for AutoDome power supply box, white Optional Mounting Accessories

For Arm Mounts

Bosch VG4-A-9541 Mast (Pole) Mounting Plate

Power Supplies

Bosch VG4-A-PSU1 Outdoor Power Supply Box (120/230 VAC Transformer)

Contractor Requirements

1.4 Examination

Examine areas to receive devices and notify adverse conditions affecting installation or subsequent operation.

Do not begin installation until unacceptable conditions are corrected.

1.5 Preperation

Protect devices from damage during construction.

1.6 Installation

Install devices in accordance with manufacturer's instruction at locations indicated on the floor drawings plans.

Perform installation with qualified service personnel.

Install devices in accordance with the National Electrical Code or applicable local codes.

Ensure selected location is secure and offers protection from accidental damage.

Location must provide reasonable temperature and humidity conditions, free from sources of electrical and electromagnetic interference.

1.7 Field Quality Control

Test snugness of mounting screws of all installed equipment.

Test proper operation of all video system devices.

Determine and report all problems to the manufacturer's customer service department.

1.8 Adjusting

Make proper adjustment to video system devices for correct operation in accordance with manufacturer's instructions.

Make any adjustment of camera settings to comply with specific customer's need.

1.9 Demonstartion

Demonstrate at final inspection that video management system and devices functions properly.

1.10 Submittals

Product Data:

Manufacturer's data, user and installation manuals for all equipment and software programs including computer equipment and other equipment required for complete video management system.

Shop Drawings; include

System device locations.

Full Schematic of system, including wiring information for all devices.

Closeout Submittals

User manual.

Parts list.

System device location plans.

Wiring and connection diagram.

Maintenance requirements.

1.11 Quality Assurance

Manufacturer:

Minimum of [10] years experience in manufacture and design Video Surveillance

Manufacturer's quality system: Registered to ISO 9001 Quality Standard.

Video Surveillance System

Listed by [UL] [EN] [FCC] specifically for the required loads. Provide evidence of compliance upon request.

Installer:

Minimum of [5] years experience installing Video Surveillance System.

1.12 Warranty

Provide manufacturer's warranty covering [3] years for replacement and repair of defective equipment.

(Revised 11/30/2011)

A. GENERAL SPECIFICATIONS

1. Edge Switches

- Switches are used for end (edge of network) device interface.
- Switches typically will be installed in traffic signal cabinets.
- Switches shall be Etherwan EX71620-AOB (6 port) or Etherwan EX 72102-AOB(8 port) series or approved equal.

The following features and standards regarding edge switches shall apply:

a. Key Features

- Meets NEMA TS2 Hardened Environmental Traffic control equipment (no fans)
- Meets IEC 61000-6-2 EMC standard immunity for Industrial environment
- Minimum 4K MAC addresses, 256K Bytes buffer memory
- Support IEEE 802.3/802.3u//802.3ab/802.3z/802.3x standards
- Minimum port configuration of:
 - o Up to 8 Ports: (6) Base 10/100BaseTX ports, (2) additional Fiber ports
 - o Options for industry standard fiber optical connectors: SC, ST, RJ-45
 - o Single-mode optical transceivers
 - o Options for long haul optics to allow distances up to 90km
- 1000M-Full-duplex, 10/100M-Full/Half-duplex, MDI/MDIX, Auto-Negotiating
- Option for up to (2) Gigabit fiber ports
- IEEE802.3x compliant flow control
- IEEE 802.1Q VLAN Tagging and port trunking groups
- NEMA TS1 & TS2 rated integrated or standalone power supply
- Support for Panel mounting installation
- Include terminal block power supply 24v DC

b. Management Support

- Packet Filtering and Port Security with MIB Statistics counters for all ports
- IEEE 802.1p QoS with classifications based on: Port based priority, VLAN Priority field in VLAN tagged frame, or DS/TOS field in IP packet
- IEEE 802.1w Rapid Spanning Tree Algorithm
- IP Multicast Filtering through IGMP Snooping
- Rate Control down to 16kbps Rate Control granularity
- RS-232 console, Telnet, Browser, and TFTP management interface

c. LED/Alarm Indicators

Per Unit: Power Status, Per Port: LNK/ACT, Alarms for power failure

d. Ethernet Standards

IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 100Base-FX IEEE 802.3ab 1000Base-T, IEEE 802.3z 1000Base-SX, 1000Base-LX

e. Forwarding Rate

- 14,880pps for 10Mbps
- 148,810pps for 100Mbps
- 1,488,100pps for 1000Mbps

f. Environmental (NEMA TS1/2)

Operating Temperature: -34°C to 74°C (-29°F to 165°F)
 Humidity: 10% to 95% Non-Condensing

Power Consumption: 20W Max.

• Warranty: 5-Year Hardware Warranty

2. Aggregation (Hub) Switches

- Hub switches are used to aggregate 100Base branch networks onto fiber optic Gigabit backbone.
- They shall be Etherwan EX9200 or Ruggedcom RG2100 series or approved equal.

The following features and standards shall apply.

Key Features:

- Meets NEMA TS2 Hardened Environmental Traffic control equipment (no fans)
- Meets IEC 61000-6-2 EMC standard immunity for Industrial environment
- Minimum 8K MAC addresses, 2M Bytes buffer memory
- Support IEEE 802.3/802.3u//802.3ab/802.3z/802.3x standards
- Minimum port configuration of:
 - o (14) 100Base FX ports, (2) 100 Base TX, (2) Gigabit Fiber ports
 - Options for industry standard fiber optical connectors: SC, ST, RJ-45
 - o Single-mode optical transceivers
 - o Options for long haul optics 75km on FX ports and 50 km on GigE ports
- 1000M-Full-duplex, 10/100M-Full/Half-duplex, MDI/MDIX, Auto-Negotiating
- Option for up to (2) Gigabit fiber ports
- IEEE802.3x compliant flow control and broadcast storm filtering
- IEEE 802.1Q VLAN Tagging, port trunking groups, port mirroring
- IEEE 802.1D Spanning Tree and IEEE 802.1w Rapid Spanning Tree
- Alarms for power failure and reset to button for local configuration/reset
- NEMA TS1 & TS2 rated integrated or standalone power supply
- Support for Rack Mount or Panel mounting installation

- Packet Filtering and Port Security with MIB Statistics counters for all ports
- IEEE 802.1p QoS with classifications based on: Port based priority, VLAN Priority field in VLAN tagged frame, or DS/TOS field in IP packet
- IEEE 802.1w Rapid Spanning Tree Algorithm
- IP Multicast Filtering through IGMP Snooping
- Rate Control for TX ports from 2Mbps to 100Mbps
- RS-232 console (CLI), Telnet, Browser, and TFTP management interface

LED/Alarm Indicators:

Per Unit: Power Status, Per Port: LNK/ACT, Alarms for power failure

Ethernet Standards:

IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 100Base-FX IEEE 802.3ab 1000Base-T, IEEE 802.3z 1000Base-SX, 1000Base-LX

Environmental (NEMA TS1/2)

Operating Temperature: -34°C to 74°C (-29°F to 165°F)
 Humidity: 10% to 95% Non-Condensing

• Power Consumption: 40W Max.

Warranty: 5-Year Hardware Warranty

3. Traffic Management Center Ethernet Switch

- Ethernet switch is used to manage network Ethernet/IP traffic from HUB and Edge switches.
- Switch shall be Cisco 3750G-12S-S Gigabit Ethernet + 12 SFP, 1U rack mountable w/ stacking.
- Switch to include Cisco SFP mini GBIC transceiver module 1000 Base LX, 1000 Base LH plug in module up to 6.2 miles – 1300 nm

DETAIL	NO. OF SHEETS	REV. DATE	DESCRIPTION
TS-INDEX	1	12/11	LIST OF TRAFFIC STANDARD DETAILS
TS-SYMB	2	11/11	SIGNING, STRIPING, SIGNAL, LIGHTING & ELECTRICAL SYMBOLS AND ABBREVIATIONS
TS-1102	2	12/11	STANDARD VIDEO DETECTION CAMERA ZONE
TS-1103	1	11/11	STANDARD CABLE COLOR DESIGNATION DETAIL
TS-1105	4	11/11	STANDARD CONDUIT & JUNCTION BOX INSTALLATION DETAILS
TS-1106	2	11/11	STANDARD TRAFFIC SIGNAL MAST ARM & POLE DETAILS
TS1107	2	09/09	STANDARD SCHOOL ZONE FLASHING BEACON DETAILS
TS-1108	2	12/11	STANDARD PED PUSH BUTTON DETAILS
TS-1109	2	12/11	STANDARD STREET NAME SIGN (MAST ARM AND POST MOUNTED) DETAILS
TS-1110	2	11/11	STANDARD SIGNAL POLE FOUNDATION DETAIL
TS-1111	2	12/11	STANDARD CABINET FOUNDATION DETAIL
TS-1112	10	03/11	STANDARD TRAFFIC STRIPE DETAILS
TS-1113	5	12/11	STANDARD LANE USE PAVEMENT MARKING DETAILS
TS-1114	3	04/08	STANDARD ROADSIDE SIGN DETAILS
TS-1115	3	05/11	SPECIAL SIGN DETAILS
TS-1116	1	03/98	STANDARD ARROWHEAD DETAIL FOR GUIDE AND REGULATORY SIGNS
TS-1117	13	12/11	STANDARD TRAFFIC SIGNAL HEAD LOCATION DETAILS
TS-1118	1	06/05	STANDARD MEDIAN ISLAND SIGNING AND STRIPING DETAILS
TS-1120	1	12/11	U-TURNS AT SIGNALIZED INTERSECTIONS
TS-1121	2	07/11	SPEED HUMP DETAILS

For questions and comments concerning these standard details, please contact the ACHD Traffic Engineering Division.

Telephone: (208) 387-6140
US Mail: ACHD Traffic Engineering Division 3775 Adams St.
Garden City, ID 83714

3/12/2012

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TS-INDEX Sheet 1 of 1

ABBREVIATIONS AND EQUIPMENT DESIGNATIONS

PROPOSED	EXISTING	
AC+		An ungrounded conductor
AC-		A grounded conductor
AWG		American wire gage
С		Conduit
CCTV	cctv	Closed circuit television
CMS	cms	Changeable message sign
DLC	dic	Loop detector lead—in cable
DMS	dms	Dynamic message sign
EMS	oms	Extinguishable message sign
EVP	ewp	Emergency vehicle preemption
FB	fb	Flashing beacon
FBCA	fbeg	Fleshing beccon control assembly
HAWK	hawk	High Intensity Activated Crosswalk
HPS	hpa	High pressure sodium
USNS	ilans	internally illuminated street name sig
LMA	lma	Luminaire mast arm
LPS	ip a	Low pressure sodium
MC	me	Mercury contactor
MER	mer	Mercury
MLC	mic	Magnetometer detector lead—in cabl
W/M	m/m	Multiple to multiple transformer
MT	mt	Conduit with pull wire or rope only
NC		Normally clased
NO		Normally open
NPAT	npat	No Parking Any Time
NSAT	nsat	No Stopping Any Time
PB	рb	Pullbox
PEC	pec	Photoelectric control
PED	ped	Pedestrion
PEU	peu	Photoelectric unit
PPB	ppb	Pedestrion push button
RIS		Radio Interference Suppressor
SB	ab	Silp Base
SIC	sic	Signal Interconnect cable
SMA	ama	Signal maet arm
S/M	a/m	Series to multiple transformer
SN		Solid neutral
SP	ap	Service point
TMS		Traffic Monitoring Station
VMS	VITE	Variable message sign
WAV	MGA	Wavetronix radar detection
XFMR	र्शास	Transformer

CONTROLLER AND SERVICE EQUIPMENT

PROPOSED	EXISTING	
	K 71	Pad Mount for Ground—Mounted Utility Transformer
	K7 Ly	Service Pedestal
	L×3	Controller Equipment Enclosure (Door Indicates Front of Enclosure)

NON ILLUMINATED ROADSIDE SIGNS

PROPOSED	<u>EXISTING</u>	
-	-	One Post Sign
**	0 0	Two Post Sign or Type II/III Barricade

SIGN LIGHTING EQUIPMENT

PROPOSED	EXISTING	
F H I		Overhead Sign (Single Post)
I	A	Overhead Sign (Two Pasts)
1	n U	Overhead Sign (Structure Mounted)

SYMBOLS

PROPOSED	EXISTING	
①	(3)	Signal head number
1	3	Project note numbers
\triangle	Δ	Conduit run numbers

PULL BOXES

PROPOSED	EXISTING	
		S40-T/Ada pull box
\boxtimes		S45—T/Ada puli box
		S45-T/Ada pull box with riser
Ø		32" x 32" pull box
		S51/Ada pull box (fiber)



12/30/2017



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Signing, Striping, Signal, Lighting and Electrical Systems
Symbols and Abbreviations

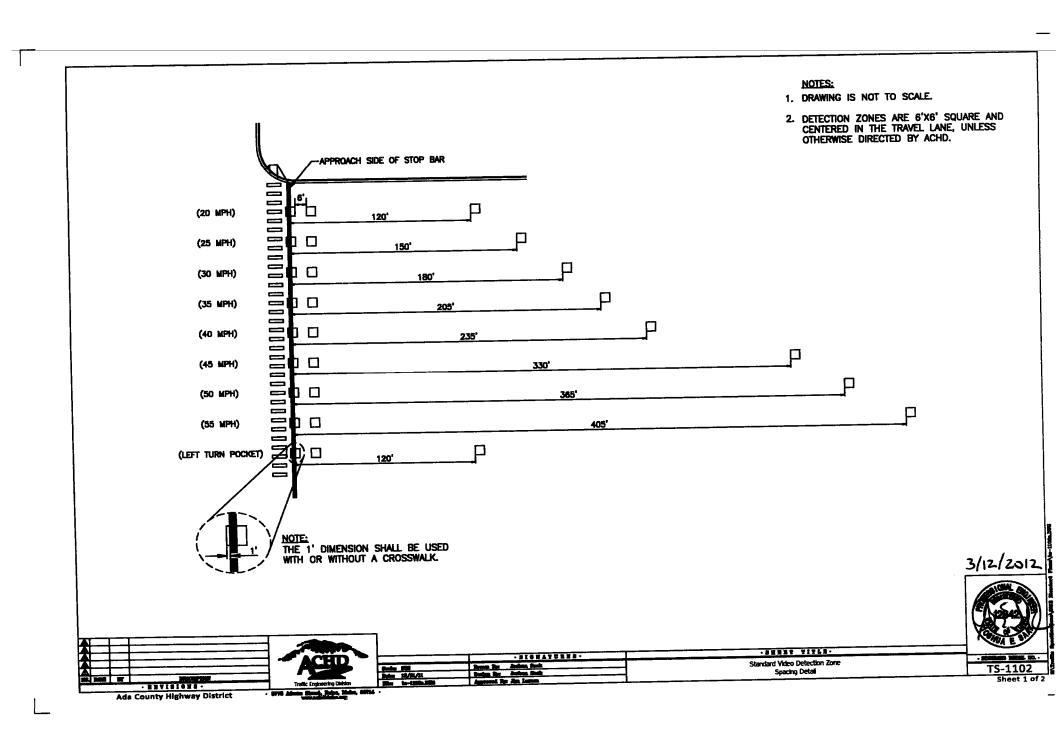
TS-SYMB

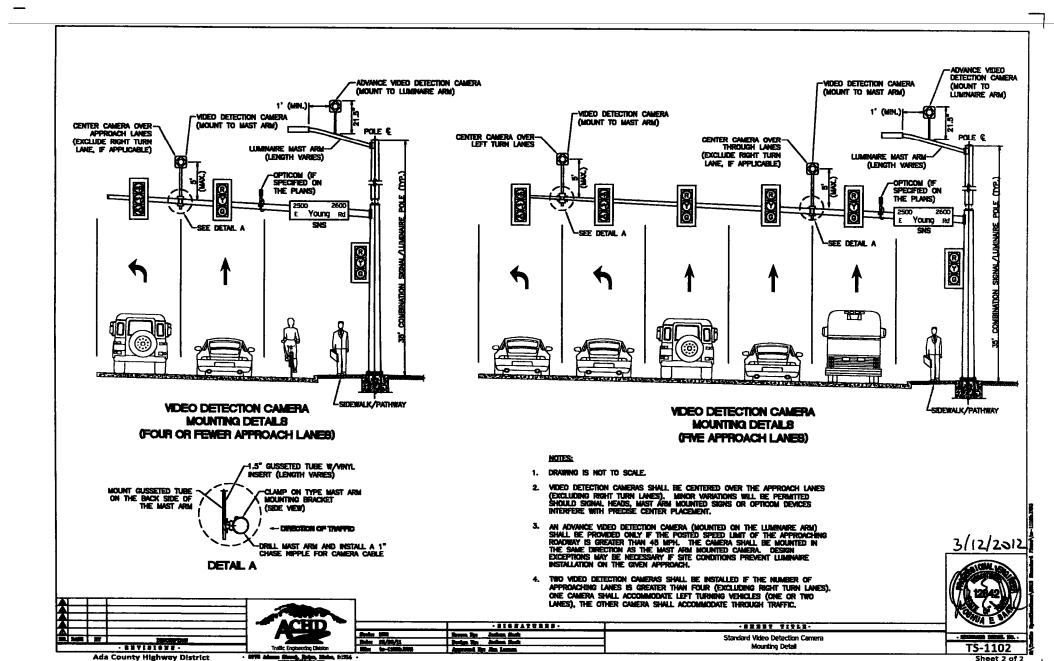
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	<u> </u>	Pedestrian Signal Head		4	₹ ~	Standard and Attached Signal Heads	
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	∠1<} <}	Vehicle Signal Face with Angle Visor Modifications of Basic Symbols:		₽¤ <u>₹</u>	\$3	Standard with Luminaire and Signal Mast Arms and Attached Signal Heads	
PV	7	"L" Indicates All Non-Arrow Sections Louvered "LG" Indicates Louvered Green		Ţ <u>.</u>	Ϋ́Υ,	Contilever Flashing Beacons	
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		"PV" Indicates Programmed Visibility Sections		∦R	` Д <u>`</u>	Floshing Beacon. One Signal Section with 12 inch Lans, Backplate and Visor. "R" Indicates Red Lens, "Y" Indicates Yellow Lens.	
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↑∢ +	4<3+	Vehicle Signal Face (3, 4 or 5 Section)		PROPOSED	EXISTING		
			5—Section Red Ball ✓ Amber Ball			Video detection zone	
		Green Arrow Green Ball Arnber Flashing Arrow Green Arrow Green Arrow	Green Ball Amber Arrow Green Arrow			Preformed Inductive Counter Loop Detector. Location of Loop Shown.	
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↓◆ —	₽<∄ <i></i> -	Vehicle Signal Face (3 or 4 Section)					
-		3_Section 3_Section 4_Section Red Arrow Red Bell Red Bell Amber Arrow 4 Amber Arrow 4 Amber Bell			MISCELLANE	OUS EQUIPMENT	
		Green Arrow Green Ball Ambar/Green Arr	row (Bi-model)	PROPOSED	EXISTING		
—	C>	Emergency Preemption Detector		*	Þ∯⊲	Closed Circuit Television Carnera (CCTV)	
*	c	Luminaire				Video Detection Cornera	12/30/2011
				▲ — ६	诶	Radar Detection Device (Advance)	(Tree)
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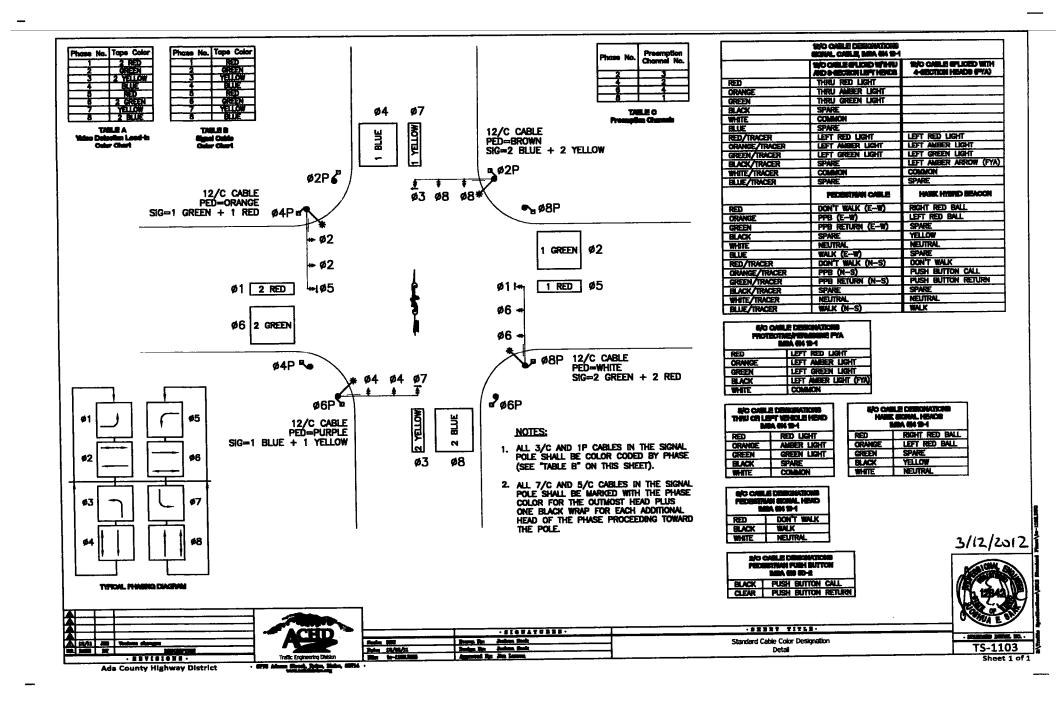
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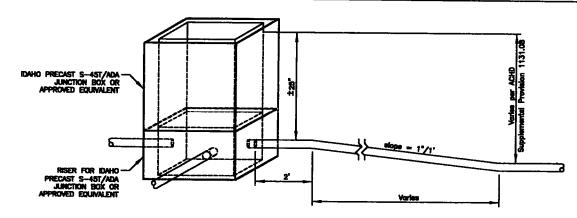
Signing, Striping, Signal, Lighting and Electrical Systems
Symbols and Abbreviations

TS-SYMB Sheet 2 of 2

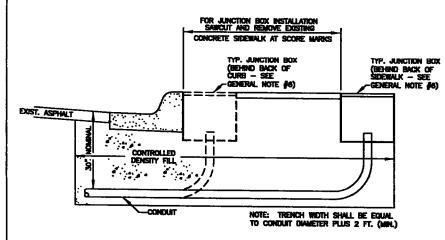








TYPICAL INTERCONNECT JUNCTION BOX INSTALLATION (Interconnect Only)



TYPICAL JUNCTION BOX INSTALLATION (Roadway Sections with Curb, Gutter and Sidewark)

Notes:

- 1. All conduit shall be 2" RPC pipe.
- Junction box shall be idaho Precast S-45/Ada unless otherwise specified on the plan.
- Junction box riser shall be Idaho Precast riser for junction box S-45T/Ada unless otherwise specified on the plan.
- Contractor shall coil 10 ft of interconnect cable in the junction box, unless otherwise specified on the plan.
- Interconnect conduit shall be on the south or west side of the road, unless otherwise specified on the plan.
- All new and existing conduits shall be terminated with a plug manufactured by "Backer Rad" and have a "bell end" or terminal adaptor with bushing.

General Notes:

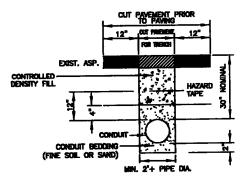
- Plan sheet references to an S-40T junction box shall be interpreted as an idaho Precast junction box type S-40T/Ada or approved equivalent.
- 2. S-40T/Ada junction boxes shall receive no more than six (6) 2" conduits.
- Plan sheet references to an S-45T junction box shall be interpreted as an Idaho Precast Junction box type S-45T/Ada or approved equivalent.
- S-45T/Ada junction boxes shall receive no more than fourteen (14) 2" conduits.
- Junction boxes that receive fifteen (15) or more conduits shall be 32" x 32".
- Junction boxes shall be located behind the back of curb whenever possible.
 if this is not possible, then they shall be located behind the back of
 sidewalk. Junction box locations on each roadway leg shall be consistent.

3/12/2012

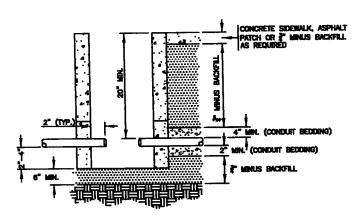
TS-1105 Sheet 1 of 4

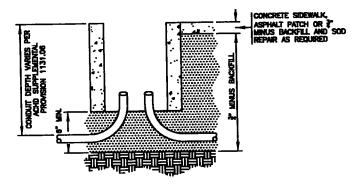
General Notes:

- 1. Conduit bedding shall be fine soil or sand.
- 2. The minus backfill shall be compacted to 95% maximum dry density in 6" lifts.
- Conduit bedding shall not be used within 3 ft. of junction box for "Detail B" junction box installations.
- 4. Top of junction box shall be flush with the surrounding grade.



TYPICAL TRENCH AND CONDUIT INSTALLATION (Under Editing Pavement)

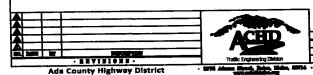




DETAIL A (Junction Box with Riser)

DETAIL B (Junction Box without Riser)

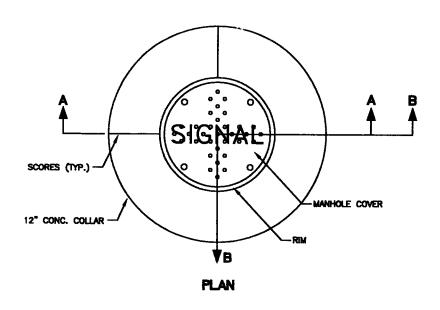
JUNCTION BOX BACKFILL DETAILS (For installations Outside of the Travel Way)

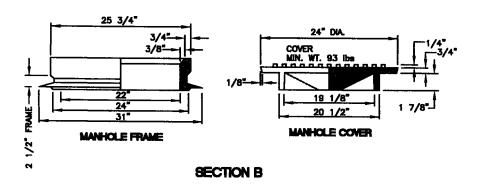


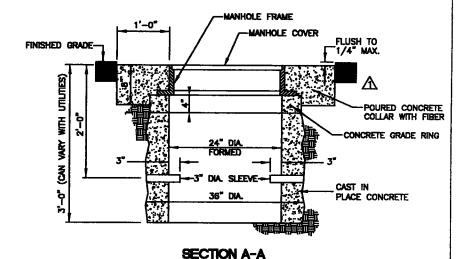
	· SIGHATURES ·	
Pade 191	Dress, No. 18th Pares	Standard Conduit and Junction Box
Balon (67/80/80	Broken Ber 18ten Steam	Intersection Detail
May by HAND THE	Agreement Plan Star Sentence	

3/12/2012









GENERAL NOTES:

- MANHOLE FRAMES AND COVERS SHALL HAVE A
 TOLERANCE OF

 OF 1° OR LESS. COVERS SHALL NOT BE
 WARPED AND ANY THAT ARE TRAVELED ON SHALL BE
 REPLACED. MACHINE ALL MATCHING SURFACES.
- MANHOLE COVERS SHALL HAVE THE TEXT "SIGNAL". TEXT HEIGHT SHALL BE 2".
- 3. TOP OF COLLAR SHALL BE FLUSH WITH MANHOLE COVER AND SHALL BE 1 BELOW TOP.
- 4. ALL NEW AND EXISTING CONDUITS SHALL BE TERMINATED WITH A PLUG MANUFACTURED BY "BACKER ROD" AND A "BELL END" OR A TERMINAL ADAPTOR WITH BUISHING.

CAST-IN-PLACE CONCRETE MAN HOLE

33./12 and interest purposes and interest pu

Streke Mill Streen Re Bridge Street Street Street Street

·BEEFFER

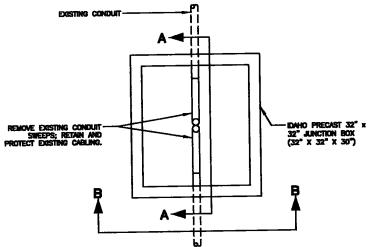
Standard Conduit and Junction Box Intersection Detail TS-1105

3/12/2012

Sheet 3 of

GENERAL NOTES:

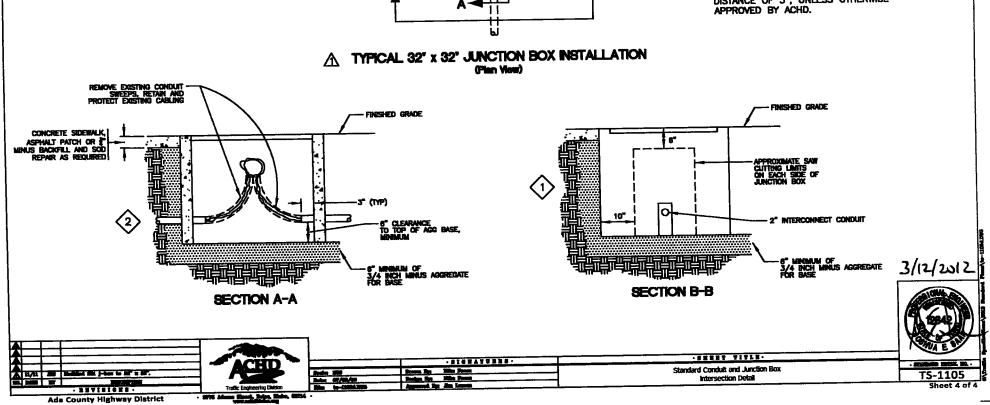
- 1. THIS DETAIL SHALL BE USED TO RETROFIT EXISTING JUNCTION BOXES TO ACCOMMODATE THE BENDING RADIUS FOR FIBER OPTIC CABLE.
- 2. * MINUS BACKFILL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY IN 6" LIFTS.
- TOP OF JUNCTION BOX SHALL BE FLUSH WITH SURROUNDING GRADE.
- 4. ALL NEW AND EXISTING CONDUITS SHALL BE TERMINATED WITH A PLUG MANUFACTURED BY "BACKER ROD" AND A "BELL END" OR A TERMINAL ADAPTOR WITH BUISHING.

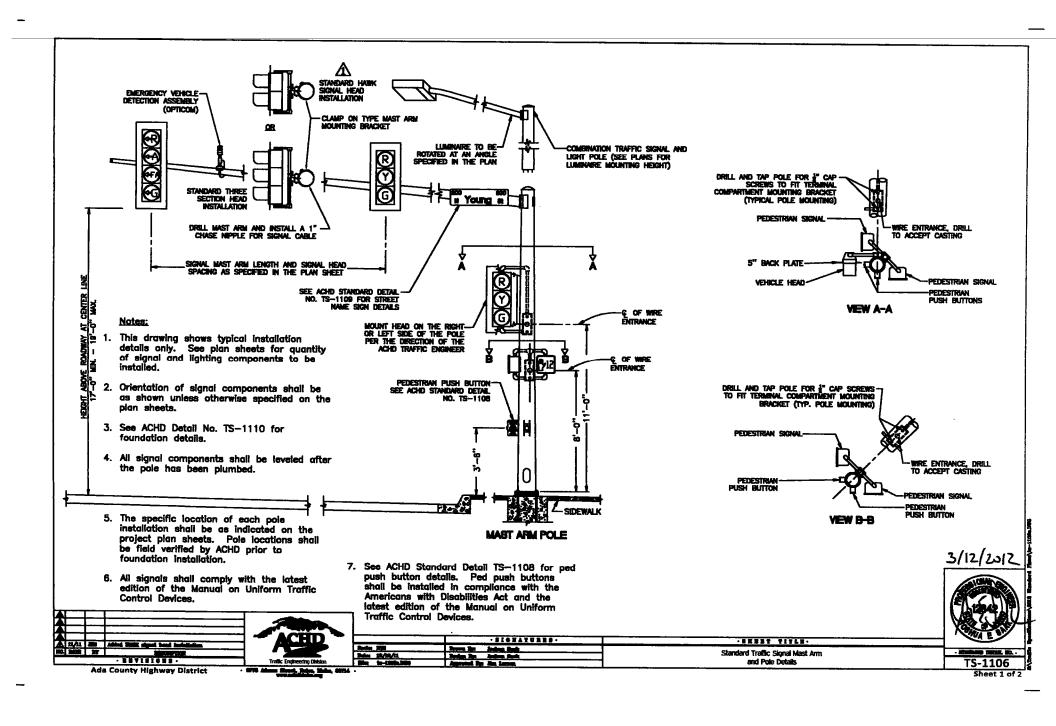


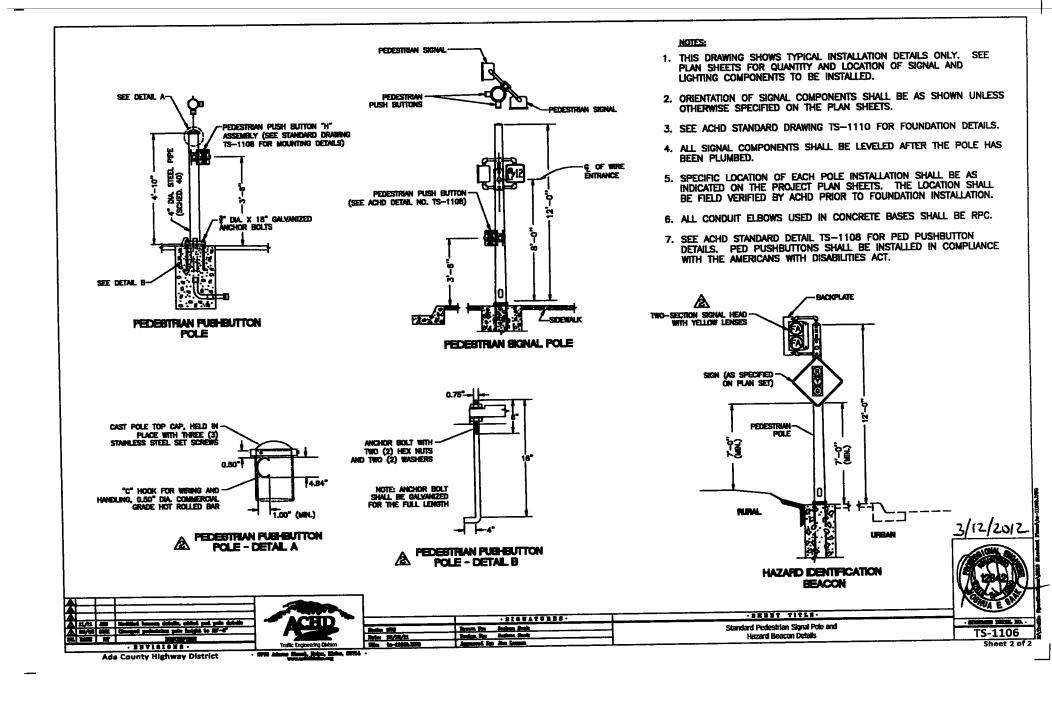
NOTES:

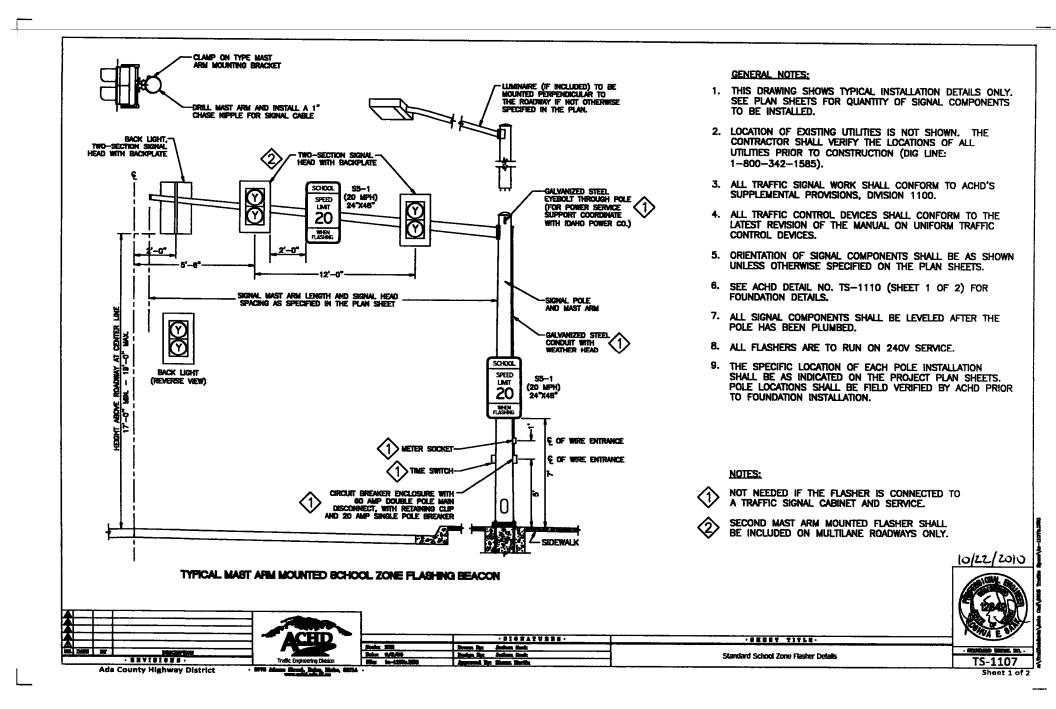
1 CONTRACTOR TO SAWCUT SLOT IN JUNCTION BOX, WITHIN SAWCUTTING LIMITS, TO ALLOW INSTALLATION OF JUNCTION BOX OVER EXISTING CONDUIT. AFTER BOX PLACEMENT, THE SLOT SHALL BE SEALED WITH NON-SHRINK GROUT TO THE FULL WALL THICKNESS.

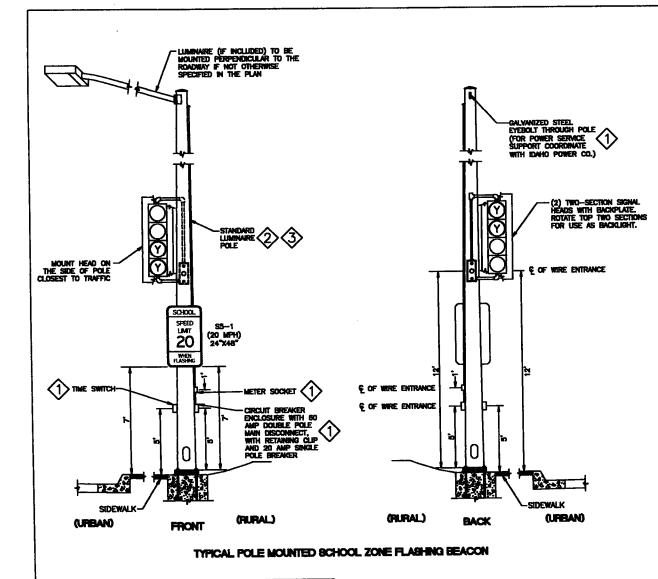
2 CONTRACTOR TO REMOVE BACKFILL SURROUNDING EXISTING CONDUIT, REMOVE EXISTING CONDUIT SWEEPS AND RETAIN AND PROTECT EXISTING CABLE. IF AFTER REMOVING SWEEPS CONDUIT DOES NOT EXTEND INTO THE NEW JUNCTION BOX, THEN SPLIT CONDUIT MANUFACTURED BY CONDUIT REPAIR SYSTEMS, INC. SHALL BE USED TO EXTEND CONDUIT INSIDE THE JUNCTION BOX. CONDUITS SHALL EXTEND INTO THE JUNCTION BOX FOR A DISTANCE OF 3", UNLESS OTHERWISE APPROVED BY ACHD.











GENERAL NOTES:

- THIS DRAWING SHOWS TYPICAL INSTALLATION DETAILS ONLY. SEE PLAN SHEETS FOR QUANTITY OF SIGNAL COMPONENTS TO BE INSTALLED.
- 2. LOCATION OF EXISTING UTILITIES IS NOT SHOWN. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION (DIG LINE: 1-800-342-1585).
- ALL TRAFFIC SIGNAL WORK SHALL CONFORM TO ACHD'S SUPPLEMENTAL PROVISIONS, DIVISION 1100.
- ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE LATEST REVISION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- 5. ORIENTATION OF SIGNAL COMPONENTS SHALL BE AS SHOWN UNLESS OTHERWISE SPECIFIED ON THE PLAN SHEETS.
- 6. SEE ACHD STANDARD DETAIL NO. TS-1110 (SHEET 1 OF 2) FOR FOUNDATION DETAILS.
- 7. ALL SIGNAL COMPONENTS SHALL BE LEVELED AFTER THE POLE HAS BEEN PLUMBED.
- 8. ALL FLASHERS ARE TO RUN ON 240V SERVICE.
- THE SPECIFIC LOCATION OF EACH POLE INSTALLATION SHALL BE AS INDICATED ON THE PROJECT PLAN SHEETS. POLE LOCATIONS SHALL BE FIELD VERIFIED BY ACHD PRIOR TO FOUNDATION INSTALLATION.

NOTES:

- NOT NEEDED IF THE FLASHER IS CONNECTED TO A TRAFFIC SIGNAL CABINET AND SERVICE.
- SEE ACHD STANDARD DETAIL TS-1106 FOR SIGNAL MOUNTING DETAILS.
- POLE MAY BE REDUCED IN HEIGHT DUE TO OVERHEAD UTILITY CONFLICTS. ACHO TO CUT POLE TO APPROPRIATE DIMENSIONS IF NOTED ON PLANS.

· SEERT TITLE ·

10/22/2010

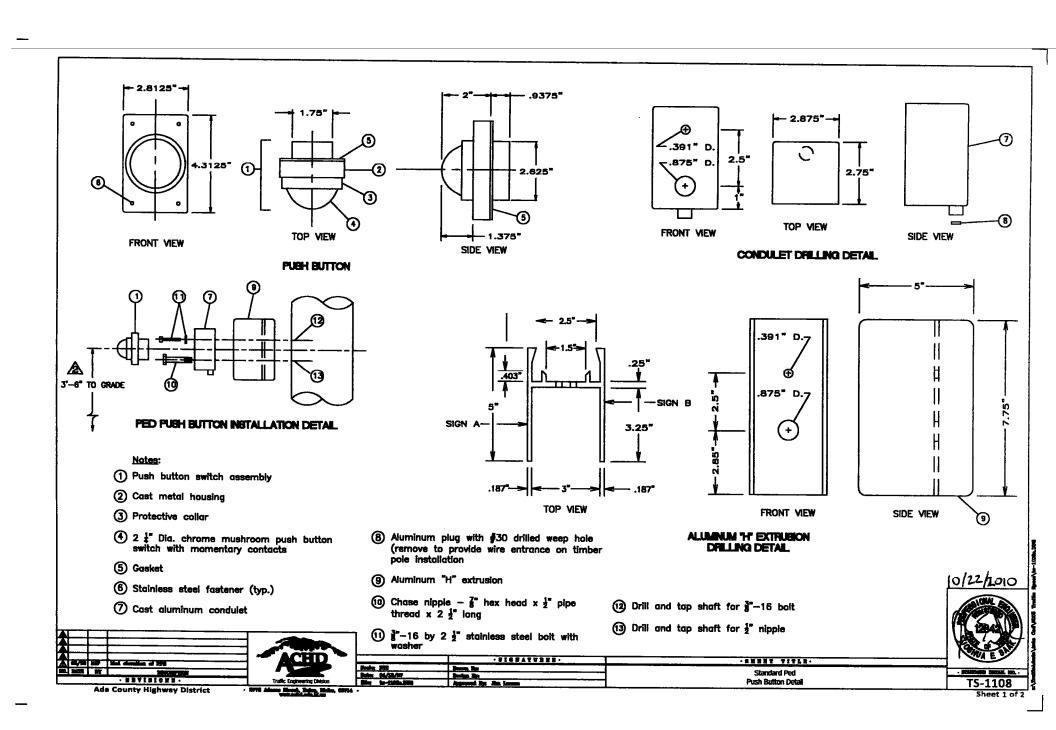


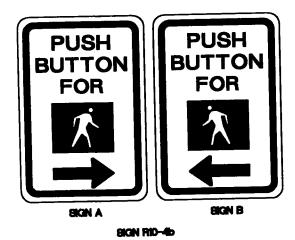
TS-1107

Standard School Zone Flasher Details TS

ACHD

HD Smoler Public Miles



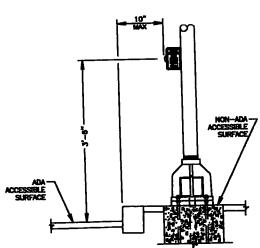


Notes:

- 1. Letters shall be a stroke non-reflectorized black enamel.
- 2. Borders, arrow and pedestrian box shall also be black enamel.
- Pedestrian figure and sign background shall be non-reflectorized white enamel.

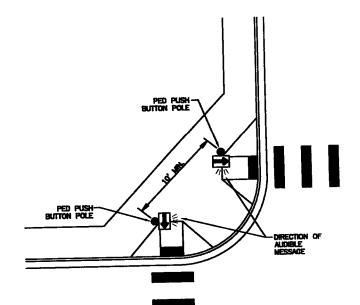
Notes:

- Ped push button pole may support a push button only or, when located on a ped pole, also support a ped signal indication.
- Ped push button, when located on a signal pole, may also support a signal most arm and luminaire.



Note: To be used when the ped push button is mounted on a pole on a non-ADA accessible surface (e.g.: median island).

ADA ACCESSELITY DETAIL Δ



3/12/2012





· BICKARDES ·

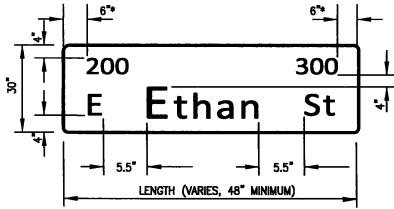
·BERRY TITLE. Standard Ped Push Button Detail

Sheet 2 of 2

Ada County Highway District

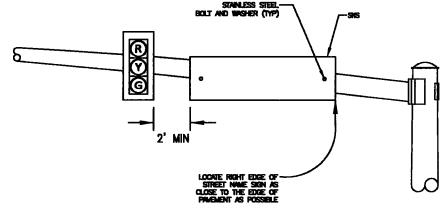


CORNER RADIUS: 2.25" BORDER WIDTH: 1"



* THE DISTANCE TO THE EDGE FOR LONGER STREET NAMES (e.g. FLOATING FEATHER) SHALL BE 3" TO 4"

STANDARD MAST ARM MOUNTED STREET NAME WITH BLOCK NUMBER SIGN (SNS)



STANDARD SNB WITH BLOCK NUMBER MOUNTING DETAIL

NOTES:

- STREET NAME SIGN SHALL BE FASTENED WITH A PELCO ASTRO SIGN BRACKET AB-0128 OR APPROVED EQUIVALENT.
- BACKGROUND FOR PUBLIC STREET NAME SIGNS AND BLOCK NUMBERS SHALL BE GREEN COLORED TYPE III PRISMATIC SHEETING CONFORMING TO ASTM D4956-04.
- BACKGROUND FOR PRIVATE STREET NAME SIGNS AND BLOCK NUMBERS SHALL BE BLUE COLORED TYPE III PRISMATIC SHEETING CONFORMING TO ASTM 04956-04.
- 4. ALL LETTERING SHALL BE WHITE REFLECTIVE DIAMOND GRADE SHEETING.
 LETTERING FOR STREET NAME SHALL BE 12" FOR THE INITIAL CAPITAL
 LETTER OF EACH WORD AND 9" LOWER CASE FOR ALL OTHER LETTERS.
 LETTERING FOR STREET NAME PREFIX AND SUFFIX SHALL BE 8"; BLOCK
 NUMBERS SHALL BE 6". FONT TYPE SHALL BE CLEARNIEW HWY 2-B.
 - SIGN BLANKS FOR STREET NAME SIGNS SHALL BE 0.125" THICK TEMPERED ALLMINUM ALLOY.

12/14/2011



TS-1109

SE/AL SE Streithed Generaler and Adults
SE/AL SE STREET ST

- 816 HATTRE
In 100 Renn Re Julius Field

94/8400 Renn Re Julius Field

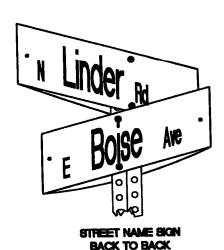
STANDARD MAST ARM MOUNTED STREET NAME SIGN DETAILS



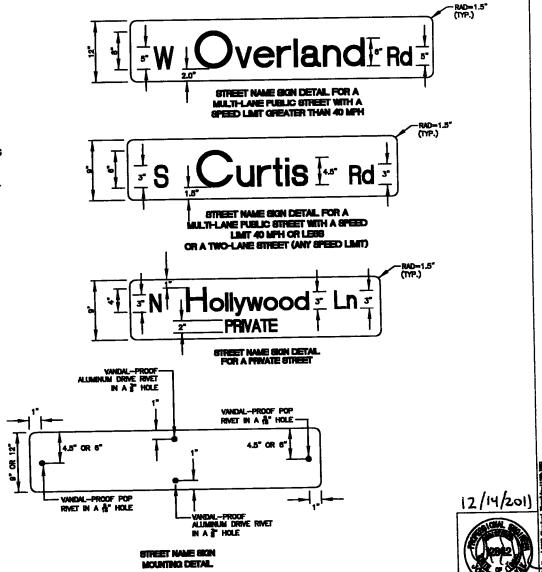
1. STREET NAME SIZES:

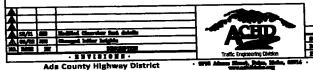
MINIMUM SIZE: 9"X18"
MAXIMUM SIZE: 12"X48"

- 2. BACKGROUND FOR PUBLIC ROAD STREET NAME SIGNS SHALL BE GREEN COLOR ENGINEERING GRADE REFLECTIVE SHEETING.
- 3. BACKGROUND FOR PRIVATE ROAD STREET NAME SIGNS SHALL BE BLUE COLOR ENGINEERING GRADE REFLECTIVE SHEETING.
- 4. ALL LETTERING FOR STREET NAME SIGNS SHALL BE WHITE COLOR ENGINEERING GRADE REFLECTIVE SHEETING. FONT TYPE SHALL BE CLEARVIEW HWY 1-B.
- 5. SIGN HEIGHT FROM THE GROUND TO THE BOTTOM OF THE STREET SIGN SHALL BE 7'-0'' (MINIMUM).



MOUNTING DETAIL

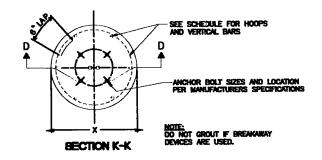


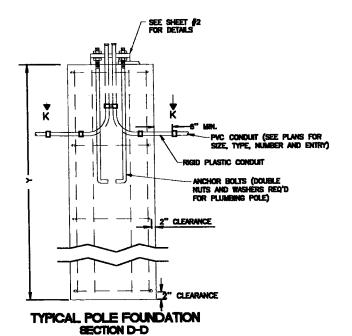


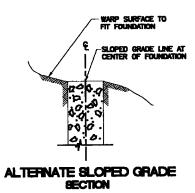
- SERBER VETER-STANDARD POST MOUNTED STREET NAME SIGN DETAILS

· SIGNATURES

TS-1109 Sheet 2 of 2







- 1. THE FOUNDATIONS SHALL BE LOCATED AS INDICATED ON THE PROJECT PLAN SHEETS. FOUNDATION LOCATIONS SHALL BE FIELD VERIFIED BY ACHD PROR TO FOUNDATION INSTALLATION.
- 2. ALL CONDUIT ELBOWS USED IN CONCRETE BASES SHALL BE RPC.
- 3. SPARE STUBOUTS SHALL BE TERMINATED WITH A COUPLING AND PLASTIC PUSH PLUG AT BOTH ENDS.
- 4. A TYPE X SIGNAL POLE CAN CARRY UP TO:
 - 1. DUAL 45' MAST ARMS
 2. A 50' MAST ARM AND UP TO A
 40' MAST ARM
 3. A 55' MAST ARM AND UP TO A
 30' MAST ARM
 - A TYPE XI SIGNAL POLE CAN CARRY UP TO:
 - 1. A 60' MAST ARM AND UP TO A 55' MAST ARM 2. A 65' MAST ARM AND UP TO A 40' MAST ARM

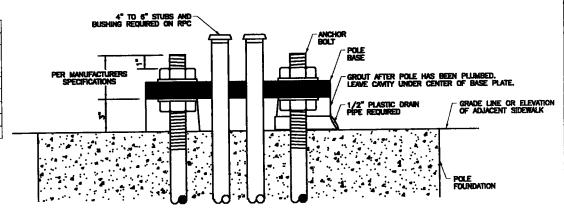
	POLE TYPE MT.HT. MASTARM LENGTH FOUNDATION X Y HOOPS NO.SZZE LB							VERTICAL RODS				
POLE TYPE	MT.HT.	MASIARM LENGIH	TYPE		T	NO.	SZE	LIN.FT.				CONCRETE
PEDESTRIAN SIGNAL POLE	12'	-	A	2'-0"	5'-0"	4	#4	23'-0"	6		28'-0"	
LIGHT/DETECTOR POLE	30'	ALL	A	2'-0"	5'-0"	4	#4	23'-0"	6	#4	28'-0"	0.6
LIGHT POLE	35'	ALL	В	2'-6"	7'-0"	4	#4	29'-4"	6	#6	40'-0"	1.3
LIGHT POLE	40'-50'	ALL	С	3'-0"	8'-0"	5	#4	44'-2"	8	#6	61'-4"	2.1
SIGNAL POLE	-	20' ~ 45'	D	3'-0"	9'-0"	5	#4	44'-2"	8	#6	89'-4"	2.4
PED. PUSHBUTTON POLE	4' 10"		E	2'-0"	2'-6"	-	_	-	-	-		0.3
DUAL MASTARM SIGNAL POLE	-	SEE NOTE 4	F/G	_	_	-	-	-	-	_	-	
TYPE X SIGNAL POLE	_	50' - 55'	F	3'-0"	12'-0"	8	#5	70'-8"	12	#6	140'	3.1
TYPE XI SIGNAL POLE	-	60' - 65'	G	3'-6"	14'-0"	9	# 5	78'-10"	12	#6	166'	5.0
CCTV POLE	50'	-	F	3'-0"	12'-0"	8	# 5	70'-8"	12	#6	140'	3.1
CCTV POLE	55'		F	3'-0"	12'-0"	8	#5	70'-8"	12	#6	140'	3.1

A 51/11 MM (0	Suppl dark Midd in L. - INVESTIGATE - INVES	ACHD Traffic Engineering Division
Ada	County Highway District	· STR Mann Street, Sales, Males, 600

	· 6168478886 ·	· CREEK TITLE ·
	Province Park Confidence Parks	STANDARD SIGNAL AND CCTV POLE
de 04/18/97	Benden, Der Andere Berdt	FOUNDATION DETAIL
Boy 14-1520-1556	Append by the Lame	

TS-1110 Sheet 1 of 2

	POLE	ATA					
		POLE BASE					
POLE TYPE	MASTARM LENGTH	SQUARE "S" (IN.)	BOLT CIRCLE (IN.)	(N,	HOLE / SLOT "Z" (IN.)		
PED PUSHBUTTON POLE	_	12.00	8.50	0.50	1.00 X 1.00		
PEDESTRIAN SIGNAL POLE	-	13.88	12.75	0.75	1.25 X 1.25		
LUMINAIRE POLE	ALL	13.88	12.75	1.00	1.13 X 1.69		
TYPE X SIGNAL POLE	20' - 55'	19.00	18.00	2.00	2.25 X 2.75		
TYPE XI SIGNAL POLE	60' - 65'	22.00	21.00	2.00	2.25 X 2.75		

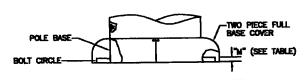


T' (SEE TABLE) TABLE POLE BASE POLE BASE

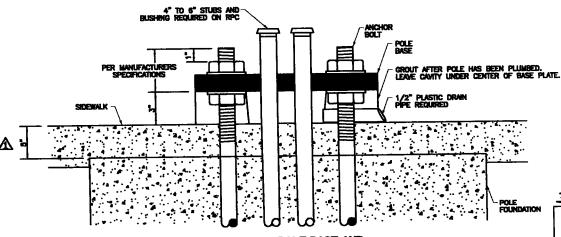
TYPICAL SIGNAL POLE BASE AND FOUNDATION BOLT DETAIL - PLAN VIEW

TYPICAL BIGNAL POLE BASE AND FOUNDATION BOLT DETAIL

TO BE USED FOR SIGNAL FOUNDATIONS NOT PLACED IN SIDEWALK



TYPICAL SIGNAL POLE BASE AND FOUNDATION BOLT DETAIL - PROFILE VIEW



TYPICAL SIGNAL POLE BASE AND FOUNDATION BOLT DETAIL

TO BE USED FOR SIGNAL FOUNDATIONS PLACED IN SIDEWALK

					1
A	11/11		Selled puls data felia	-	L
A	7/1		والمناد لمع إلمانة وبيدا عليم إليابا	- ACHD	L
X	81/18		مستنبة السابة استحبا	A	
3			100.0000		П
_	-	-7	. REVIETORE .	Traffic Engineering Diesion	П

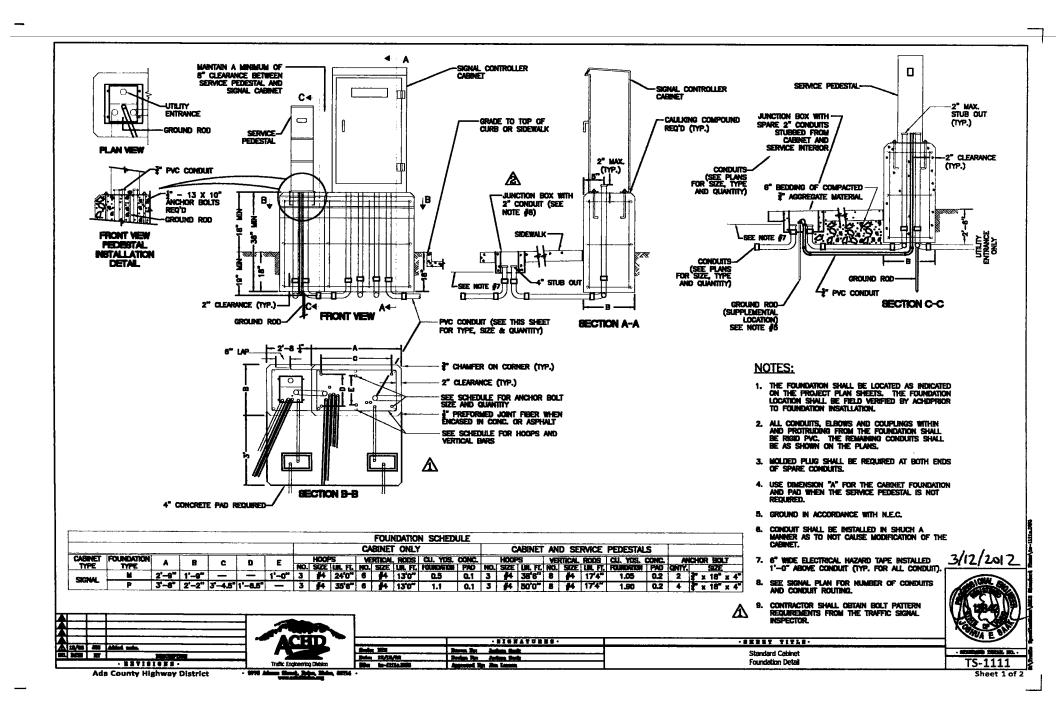
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STANDARD SIGNAL POLE FOUNDATION DETAIL TS-1110

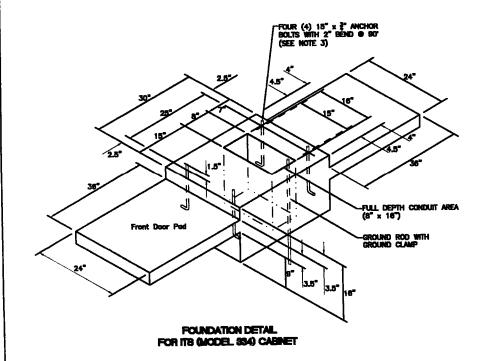
3/12/2012

Ada County Highway District

· STIE Admin Shoot, Raba, Make, 60754



- Install ground rod wire conduit in all cabinet foundations. Ground rod wire comount shall be used when an additional ground rod is required.
- 2. BONDING AND GROUNDING SHALL MEET THE NATIONAL ELECTRIC CODE AND ACHD STANDARDS.
- 3. VENDOR WILL PROVIDE DMS CABINET.



3/12/2012



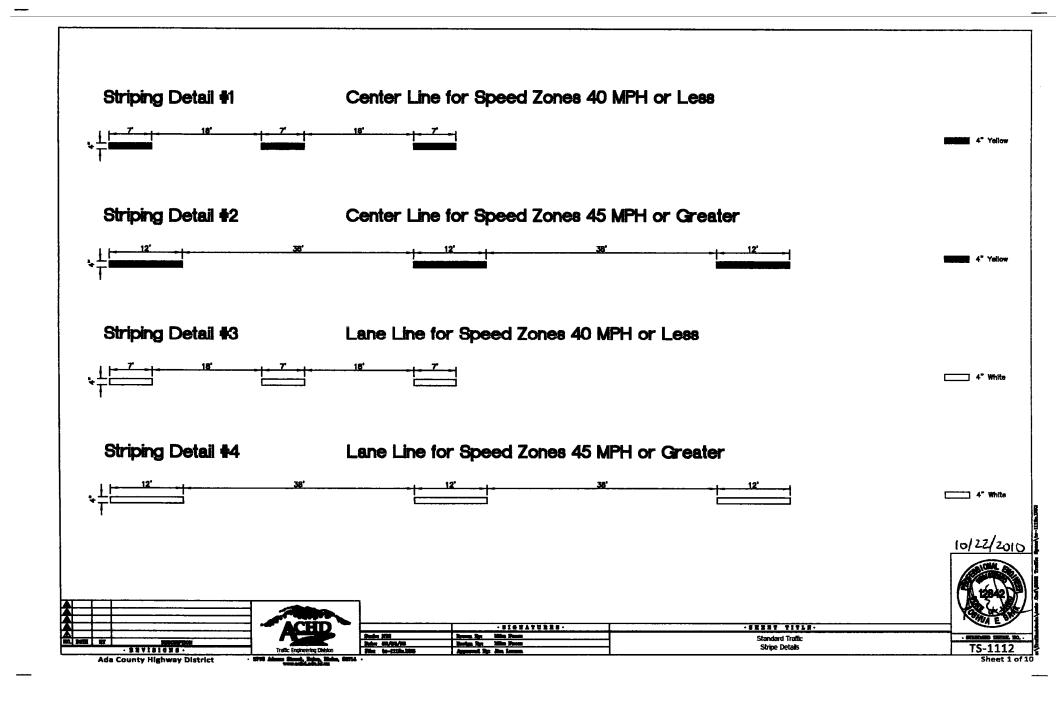
 - ACHD

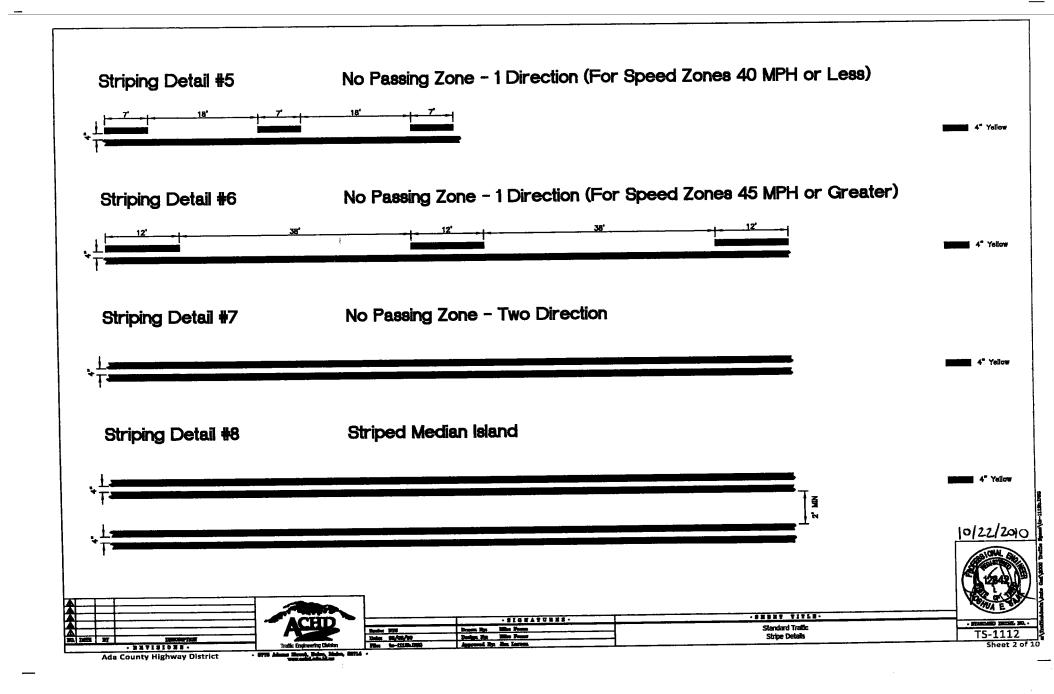
· BEVIETE:

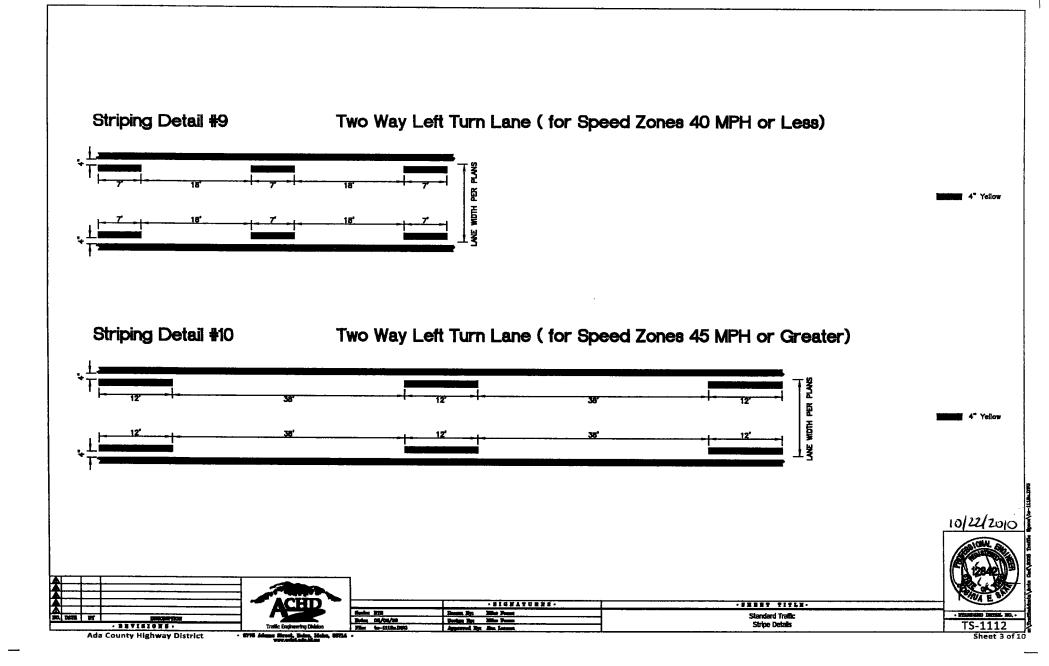
Ada County Highway District

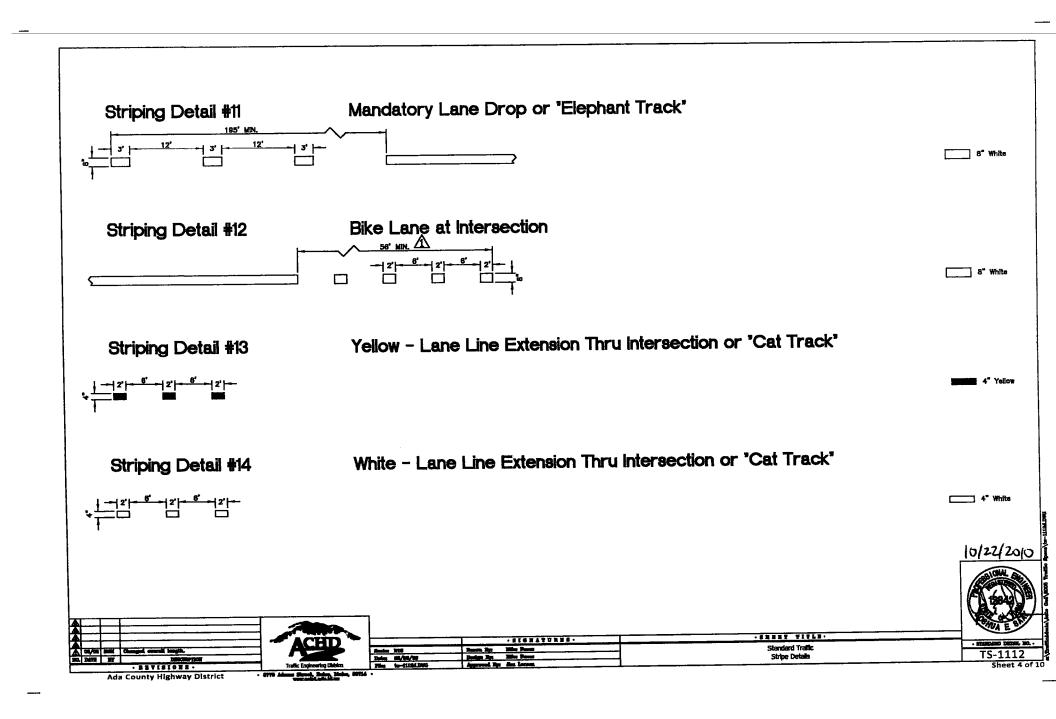
Orth Marcy Street, Party, Marcy St.

TS-1111 Sheet 2 of 2

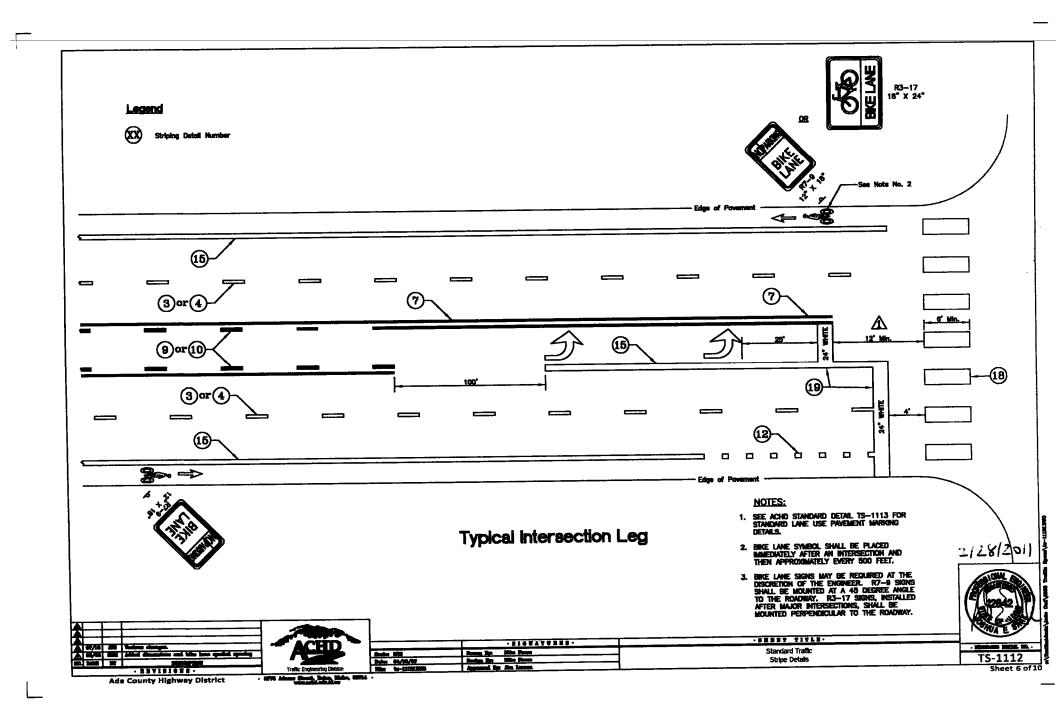


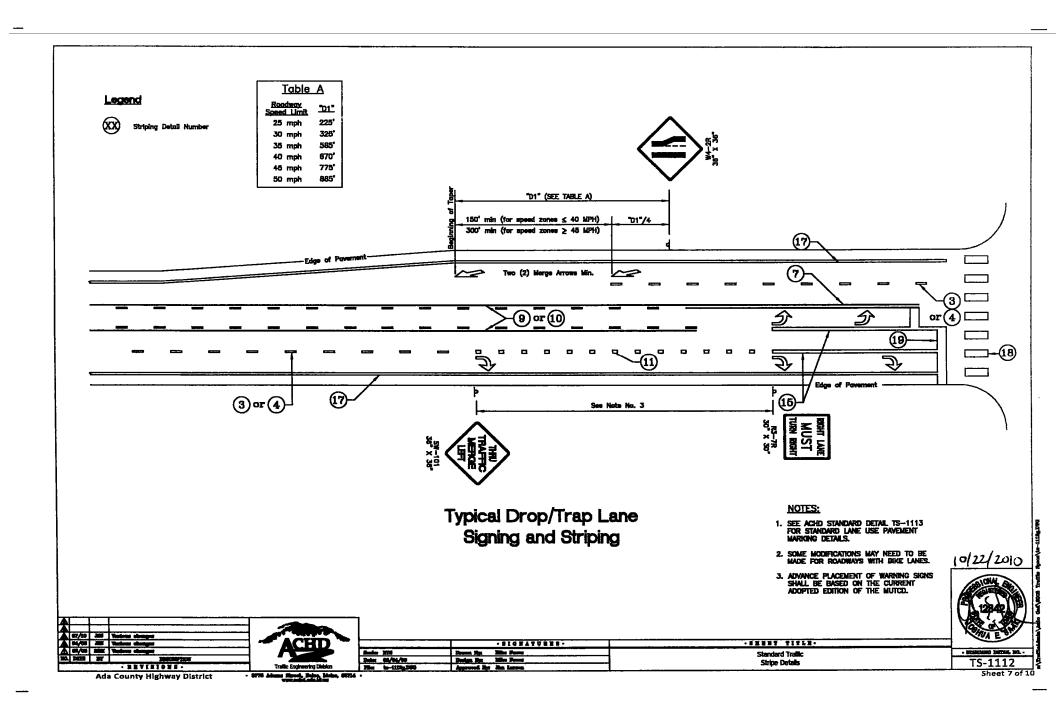


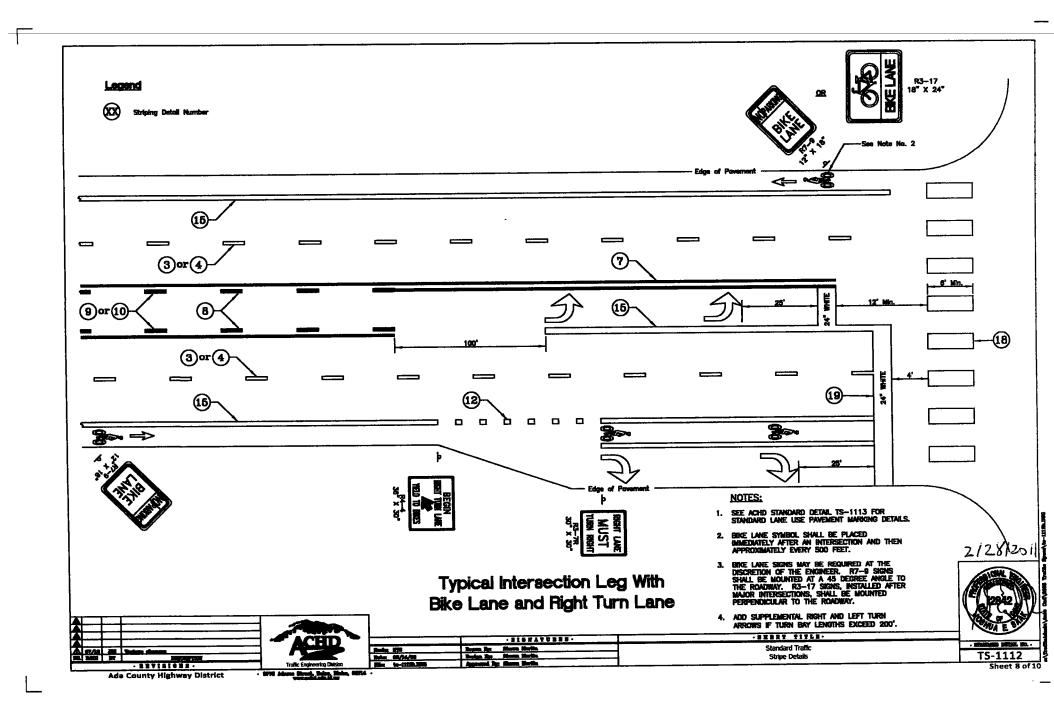


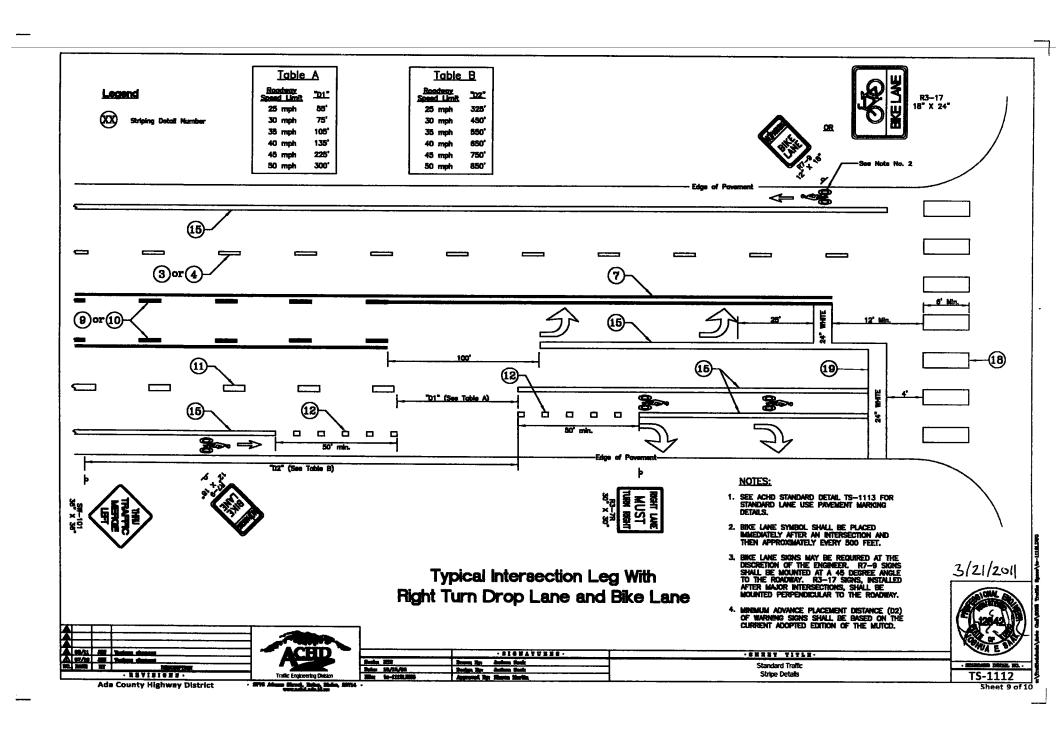


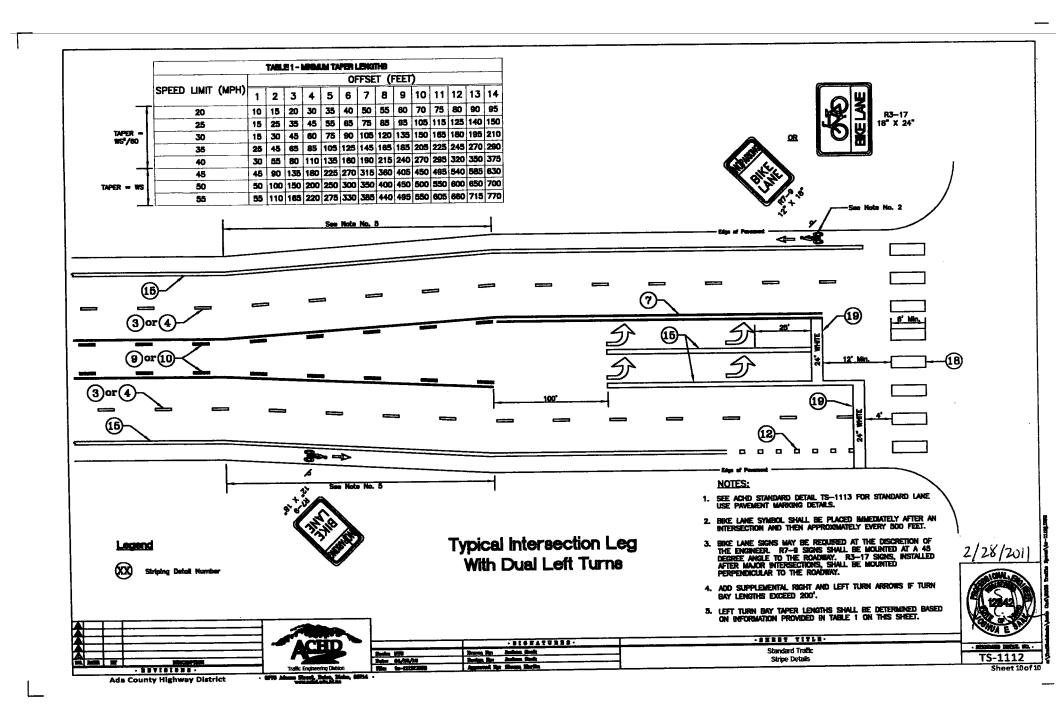
Striping Detail #15	Channelizing Line / Bike Lane Line	I	8" White
Striping Detail #16	Left Edgeline for Divided Roadway		4" Yellow
Striping Detail #17	Right Edgeline		
Striping Detail #18 A	Crosswalk (Note: Crosswalk is centered on centerline of pedestrian ramps)		4" White
Crosswork ©	4' (Typ.) 8' (Min.)/9'/12' 4' Min	[24" Write
Striping Detail #19 🛦	Stop Bar	[24" White
Striping Detail #20 🛦	Roundabout Entry Marking		11/22/2010
A CHD	- AIGHATUBIS.	8" White	(234) (344)
** B # Y 1 0 2 0 # 8 • Trafic Engineering Dickion Ada County Highway District • ### Admin Time Time Time Time Time Time Time Time		Standard Traffic Stripe Details	TS-1112 Sheet 5 of 1

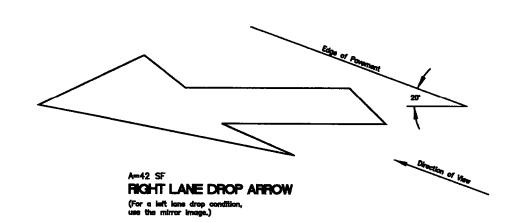


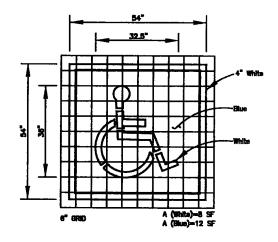




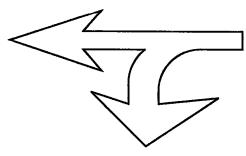




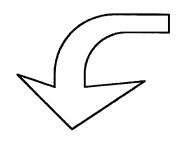




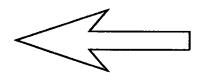
HANDICAPPED PARKING SYMBOL



A=29 SF
THRU/LEFT TURN ARROW
(For the thru/right turn arrow, use the mirror image.)



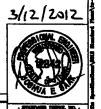
A=16 SF
LEFT TURN AFROW
(For the right turn errow, use the mirror image.)



A=12 SF THRU ARROW

NOTES:

FOR PAYEMENT MARKING DIMENSIONS, SEE THE "STANDARD HIGHWAY SIGNS" BOOK, MINOR VARIATIONS IN DIMENSIONS MAY BE ACCEPTED BY THE ENGINEER.



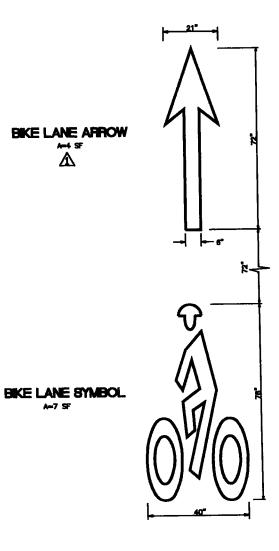
 · # # # # # # # # # # # # # # # # # # #	- BENET TITLE -
 Renne By Malant Penny	Standard i ane tise

· ERVISIONS · Ada County Highway District

1976 Admin Shoot, Dales, Males, 2074

States for Maked Street Approved Str. Jim Season. Standard Lane Use Pavement Marking Details

TS-1113



TYPICAL WORD MARKINGS

(Area calculated for typical word markings placed in the travel way.)

Text	Area (SF)
25	18
35	17
40	20
AHEAD	31
BIKE	21
BUS	20
CAR	17
CLEAR	27
HERE	26
KEEP	24
LANE	24
LEFT	19
NO	5
PED	18
RIGHT	26
SCHOOL	35
SIGNAL	32
SLOW	23
TURN	24
VEHICLES	42
WAIT	19
XING	21

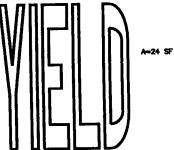
NOTES:

- If A MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHOULD READ "UP", I.E., THE FIRST WORD SHOULD BE NEAREST THE DRIVER.
- 2. THE SPACE BETWEEN WORDS SHOULD BE AT LEAST FOUR TIMES THE HEIGHT OF THE CHARACTERS FOR LOW SPEED ROADS, BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTERS. THE SPACE MAY BE REDUCED APPROPRIATELY WHERE THERE IS LIMITED SPACE BECAUSE OF LOCAL CONDITIONS.
- 3. MINOR VARIATIONS IN DIMENSIONS MAY BE ACCEPTED BY THE ENGINEER
- 4. PORTIONS OF A LETTER, NUMBER OR SYMBOL MAY BE SEPARATED BY CONNECTING SEGMENTS NOT TO EXCEED

· SISHATURES ·



A=22 SF





3/12/2012



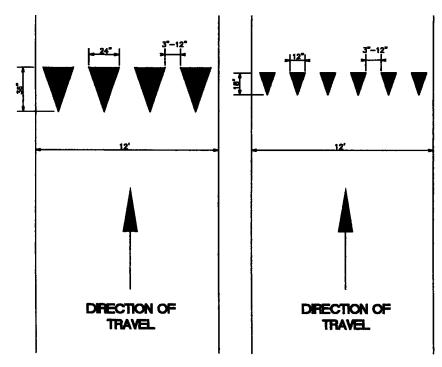
Standard Lane Use

Pavement Marking Details

NAAISIONS. **Ada County Highway District**

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TS-1113 Sheet 2 of 5



YIELD LINE LAYOUT POSTED SPEED)25 MPH

A=3 SF (PER TRANGLE)

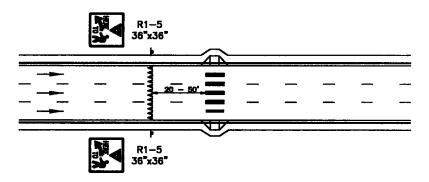
YELD LINE LAYOUT POSTED SPEED (25 MPH A-0.76 SF (PER TRANSLE)

NOTES:

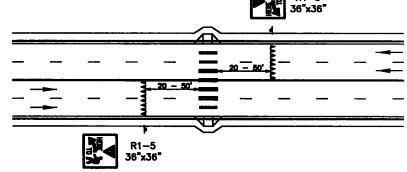
- 1. TRIANGLE HEIGHT IS EQUAL TO 1.5 TIMES THE BASE DIMENSION.
- 2. TRANGLE SPACING MAY NEED TO BE ADJUSTED BASED ON THE WIDTH OF THE TRAVEL LANE.
- 3. 18" YIELD LINE MARKINGS SHALL ONLY BE INSTALLED WITH THE PERMISSION OF THE ACHD TRAFFIC ENGINEER.

EXAMPLES OF YIELD LINES AT UNSIGNALIZED MIDBLOCK CROSSINGS

A. ONE-WAY ROADWAY







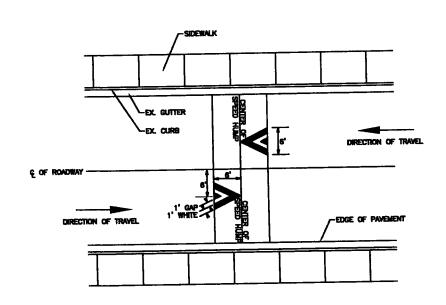
NOTES:

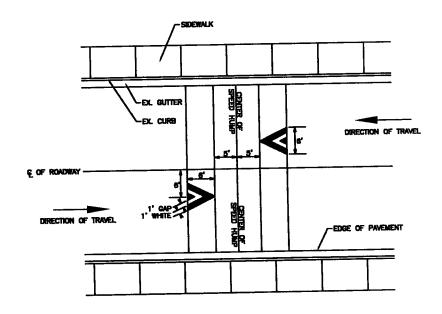
 If "Stop Here for Pedestrians" signs are used Instead of "Yield Here to Pedestrians" signs, stop Bars Shall be used Instead of Yield Markings.



TS-1113 Sheet 3 of

3/12/2012





SPEED HUMP MARKINGS LAYOUT LOCAL ROAD

SPEED HUMP MARKINGS LAYOUT COLLECTOR ROAD

MATTER.

- ADVANCE SPEED HUMP MARKINGS MAY BE USED IN ADVANCE OF SPEED HUMPS WHERE ADDED VISIBILITY IS DESIRED. ALL ADVANCE STRENG SHOULD BE IN ACCORDANCE WITH THE MUTCO.
- 2. APPROPRIATE ADVANCE WARNING SIGNS MAY BE USED WITH ALL SPEED HUMP RISTALLATIONS.

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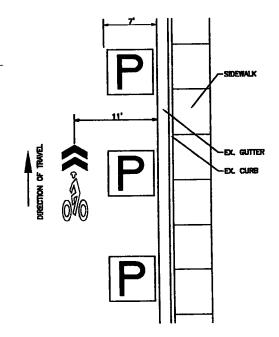
TS-1113 Sheet 4 of 5



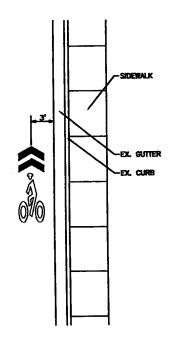
Shared Lane Marking ("Sharrow") Details

MOTES

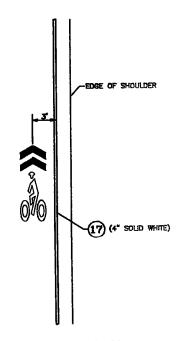
- 1. WHEN USED, "SHARROWS" SHOULD BE PLACED MAKEDIATELY AFTER PUBLIC STREET INTERSECTIONS AND SPACED AT INTERVALS NOT GREATER THAN 250' THEREAFTER.
- 2. WHEN USED IN A SHARED LANE WITH ON-STREET PARKING, "SHARROWS" SHOULD BE PLACED SO THAT THE CENTERS OF THE MARKINGS ARE 11' FROM THE EDGE OF PAVEMENT.
- 3. WHEN USED IN A SHARED LANE WITH NO ON-STREET PARKING, "SHARROWS" SHOULD BE PLACED SO THAT THE CONTERS OF THE MARKINGS ARE 3' FROM THE EDGE OF BANGERS
- 4. IN THE ABSENCE OF CURB AND GUTTER, "SHARROWS" SHOULD BE PLACED 3" FROM THE EDGELINE MARKING.
- 8. "SHARROWS" SHALL NOT BE INSTALLED ON ROADWAYS WITH A SPEED LIMIT GREATER THAN 30 MPH.
- 6. SIGNIFICANT VARIATIONS TO "SHARROW" PLACEMENT OUTLINED ABOVE SHALL BE APPROVED BY THE ACHO TRAFFIC ENGINEER PRIOR TO INSTALLATION.



Shared i...ane Marking ("Sharrow") Placement With On-Street Parking, Curb and Gutter



Shared Lane Marking ('Sharrow') Placement With No On-Street Parking, Curb and Gutter



Shared Lane Marking ("Sharrow") Placement With No On-Street Parking, No Curb and Gutter

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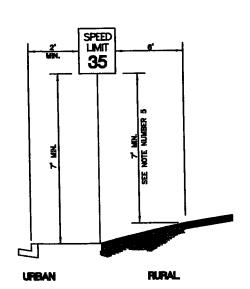
Standard Lane Use
Pavement Marking Details - Shared Lane Markings

TS-1113

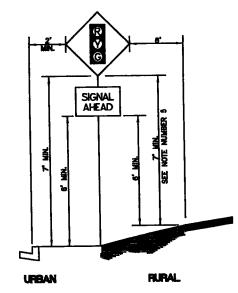
Ade County Highway District

Sheet 5 of

- 1. POSTS SHALL BE 2" X 2" 14-GAUGE A.S.T.M. A570.
- 2. ANCHOR SHALL BE 2.25" X 2.25" 12-GAUGE A.S.T.M. A570.
- 3. SIGN POSTS INSTALLED ON URBAN ROADWAY SECTIONS WITH ATTACHED SIDEWALKS NARROWER THAN 8' SHALL BE LOCATED BEHIND THE SIDEWALK.
- 4. SIGN POSTS INSTALLED ON URBAN ROADWAY SECTIONS WITH DETACHED SIDEWALKS SHALL BE LOCATED IN THE PLANTER STRIP BETWEEN THE CURB AND SIDEWALK.
- 5. ON RURAL SECTIONS WHERE CONDITIONS EXIST THAT MAKE THE 7' HEIGHT IMPRACTICAL, A 5' MOUNTING HEIGHT TO THE BOTTOM OF THE PRINCIPAL SIGN IS ACCEPTABLE.



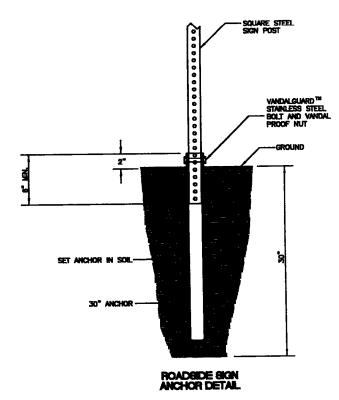
ROADBIDE SIGN POST WITH PRIMARY SIGN



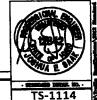
ROADSIDE SIGN POST WITH PRIMARY AND SECONDARY SIGNS (30" ANCHOR)

Brown Br. Meland Press Broken Rp. Michael Press

· SIGNATURES ·

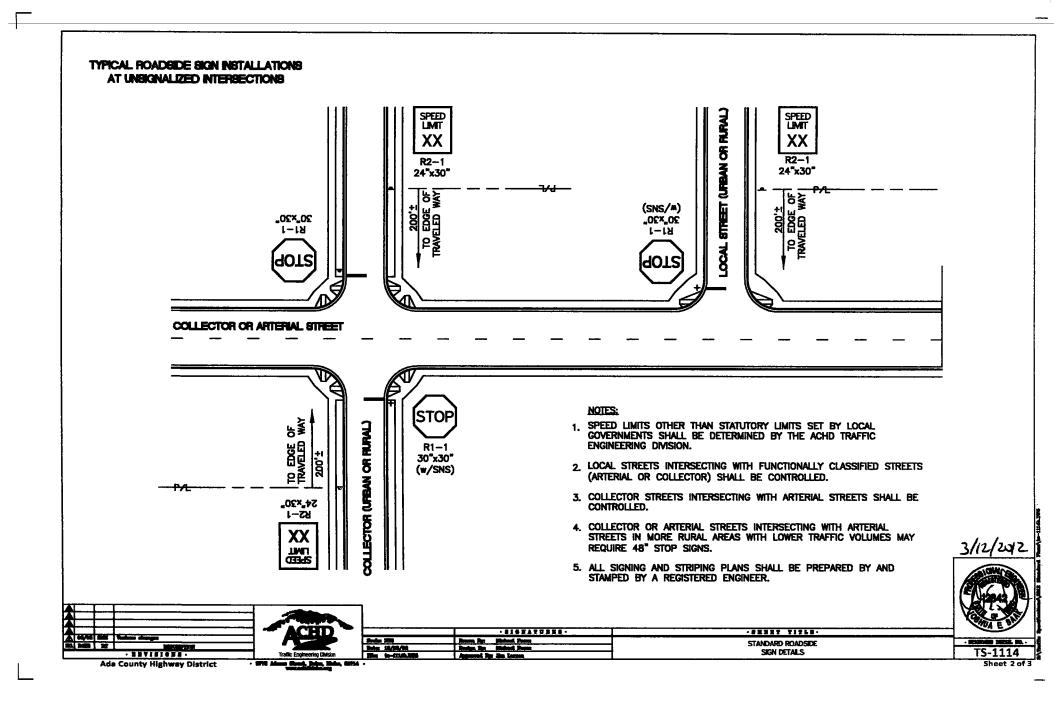


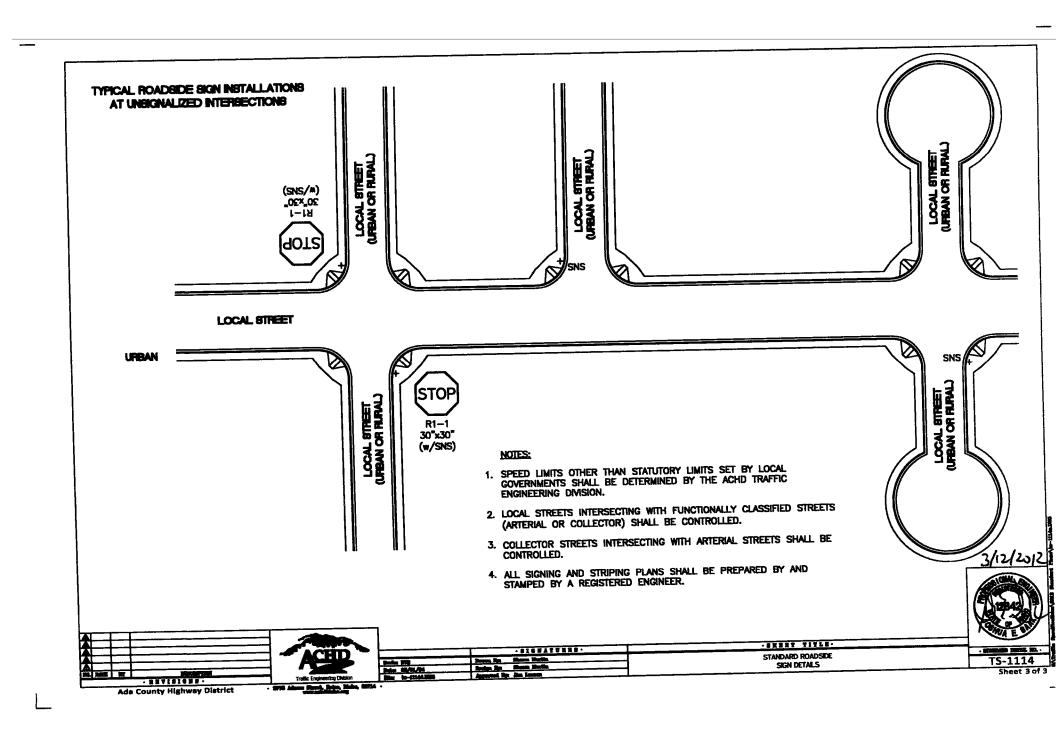
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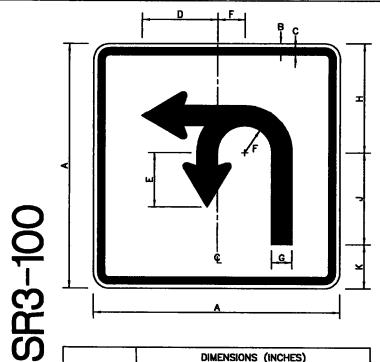


·BERRY TIPLE. STANDARD ROADSIDE SIGN DETAILS

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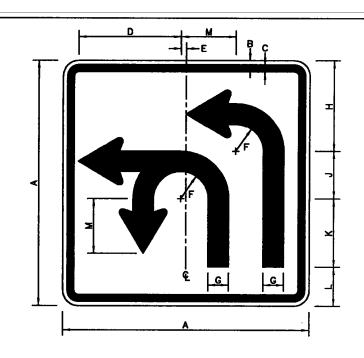
SIZE	DIMENSIONS (INCHES)						
SIZE	A	В	С	D	E		
MINIMUM	24	3/8	5/8	7 3/8	5 3/8		
STANDARD	36	5/8	7/8	11	8		

١	SIZE		DIMEN	SIONS (IN	CHES)	
l	3125	F	G	Н	J	К
	MINIMUM	2 5/8	2	10 5/8	9	4 3/8
	STANDARD	4	3	16	13 1/2	6 1/2

- **NOTES:**
- 1. FOR ARROWHEAD DIMENSIONS, SEE ACHD STANDARD DETAIL TS-1116.
- 2. ARROW AND BORDER COLORS SHALL BE BLACK. SIGN BACKGROUND COLOR SHALL BE WHITE (REFL.).

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SIZE	DIMENSIONS (INCHES)									
	Α	В	С	D	E	F				
MINIMUM	24	3/8	5/8	10	1/2	2 5/8				
STANDARD	36	5/8	7/8	15	3/4	4				

SIZE	DIMENSIONS (INCHES)									
SIZE.	G	Н	J	к	L	М				
MINIMUM	2	8 15/16	4 3/4	8 11/16	3 5/8	5 5/16				
STANDARD	3	13 1/4	7	10	5 3/4	8				

POLICY:

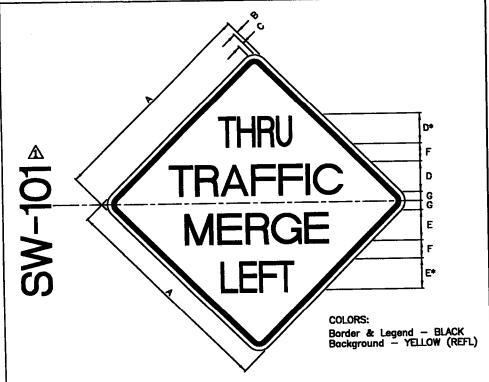
LANE USE CONTROL SIGN MAY BE USED AT SIGNALIZED INTERSECTIONS WITH SEPARATE TURN PHASES. THESE SIGNS MAY ALSO BE USED TO INDICATE THE TYPES OF MOVEMENTS PERMITTED AT MAJOR INTERSECTIONS.

SERRY TITLE. SPECIAL SIGNS DETAILS

2/28/2011

TS-1115

Ada County Highway District

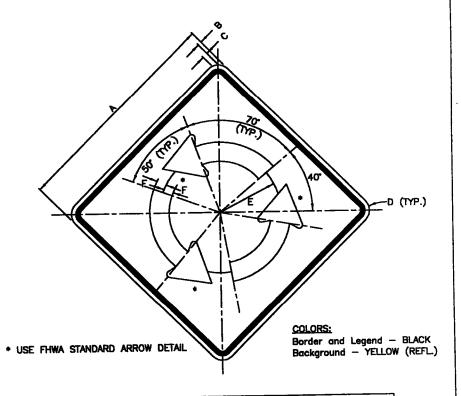


* Reduce spacing 70%

SIZE	CORNER	DIMENSIONS (INCHES)							
	RADIUS	A	В	С	D	E	F	G	
MINIMUM	2 1/4	36	5/8	7/8	5D	5E	3	1 1/2	
STANDARD	3	48	3/4	1 1/4	6 D	6E	4	2	
FREEWAY	3 3/4	60	7/8	1 1/2	8D	8E	5	2 1/2	

POLICY:

THE "THRU TRAFFIC MERGE LEFT (RIGHT)" SIGN SHALL BE USED TO INFORM MOTORISTS THAT THE INSIDE OR OUTSIDE LANE IS BEING DROPPED AND THRU TRAFFIC MUST MERGE TO AVOID BEING TRAPPED IN A MANDATORY EXIT OR TURN LANE.



	DIMENSIONS (INCHES)									
SIZE	Α	В	ВС		Ε	F				
STANDARD	36	5/8	7/8	2 1/4	10	1 5/8				
EXPRESSWAY	48	3/4	1 1/4	3	13 1/4	2 1/8				

POLICY:

THE "ROUNDABOUT AHEAD" SIGN SHALL BE USED ON COLLECTOR AND ARTERIAL ROADWAYS TO INFORM MOTORISTS THAT A ROUNDABOUT IS LOCATED AT THE NEXT MAJOR INTERSECTING ROADWAY.



2/28/2011

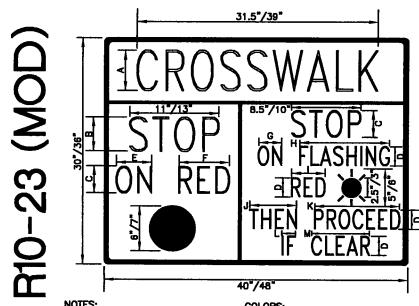
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BERRY TIPLE. SPECIAL SIGNS DETAILS

TS-1115

Ada County Highway District



1. ALL FONTS ARE TO BE HIGHWAY GOTHIC "C".

2. FOR BACKGROUND, MATERIAL IS TO BE WHITE DIAMOND GRADE SHEETING.

COLORS:

Border - BLACK

Legend (CROSSWALK) — WHITE (REFL.) Background (CROSSWALK) — BLACK

Legend (STOP...) — BLACK Background (STOP...) — WHITE (REFL.)

SIZE	CORNER DIMENSIONS (INCHES)													
	RADIUS	Α	В	С	۵	E	F	G	Н	1	J	к	L	М
STANDARD	2	5.25	4.5	3.5	2.5	4.5	6.5	3.25	12.5	5	6.5	12	2.25	9.5
LARGE	3	6.25	5.25	4.25	3.25	5.25	7.75	4	15	6	8	14	2.5	11.5

GUIDANCE:

THE "CROSSWALK STOP ON RED" SIGN SHALL BE USED AT PEDESTRIAN HYBRID BEACONS TO INFORM MOTORISTS THAT THE FLASHING RED INDICATION INDICATES A DRIVER MAY PROCEED IF PEDESTRIANS HAVE COMPLETED CROSSING. THE "LARGE" SIGN SHOULD BE USED IN ALL APPLICATIONS UNLESS OTHERWISE APPROVED BY THE ACHD TRAFFIC ENGINEER.

5/18/2011

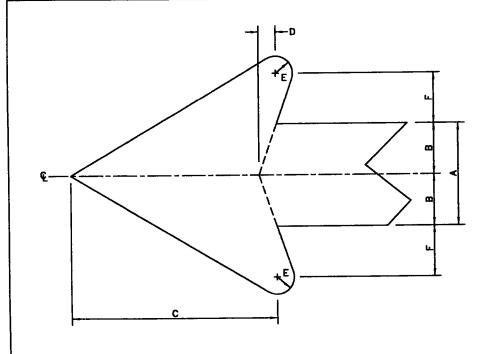


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· SIGNATURES ·

BREST TITLE. SPECIAL SIGNS DETALS

TS-1115



DIMENSIONS								
В	С	D	E	F				
0.500A	2.030A	0.155A	0.200A	0.650A				

A = Width of shaft

10/22/2010

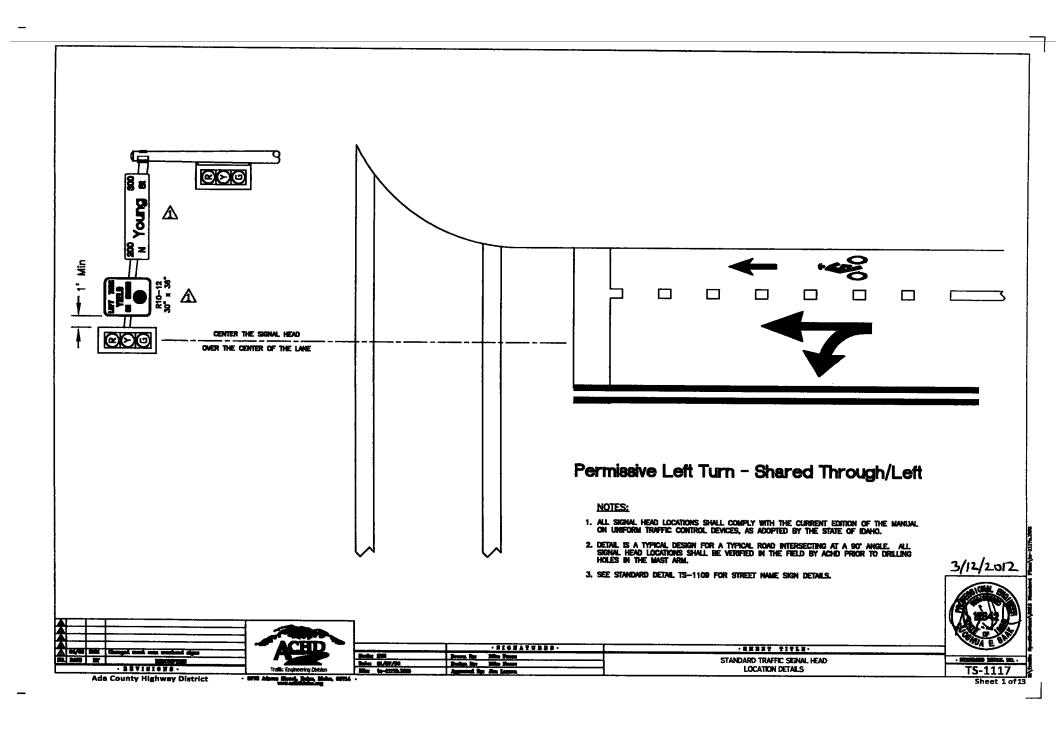


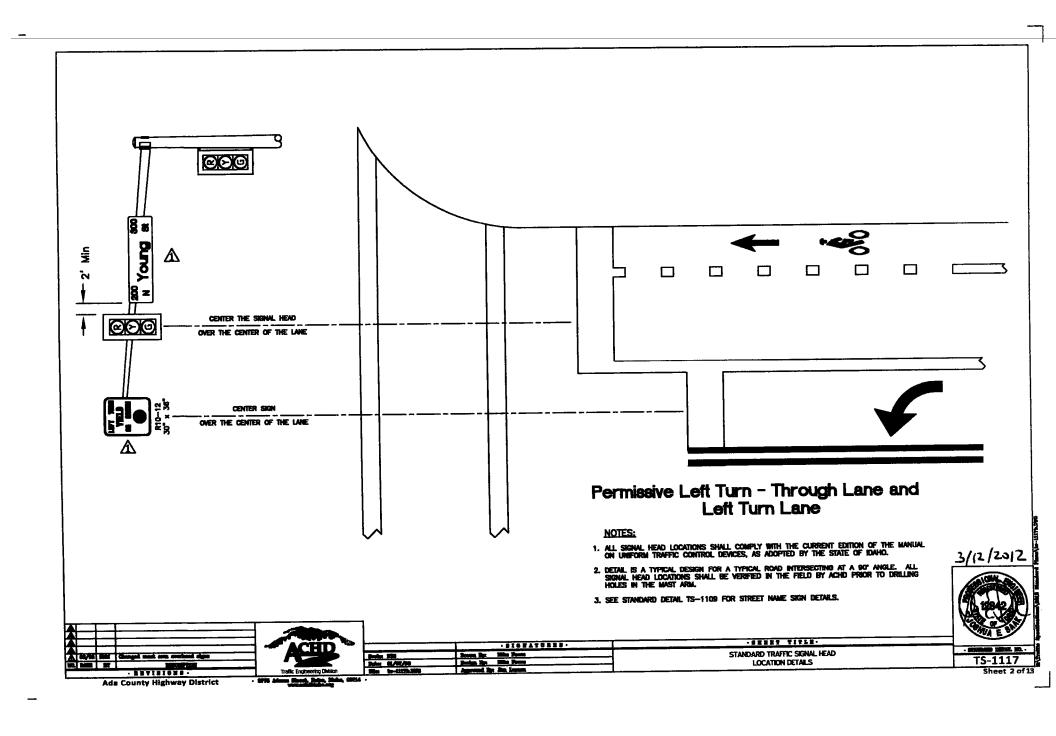
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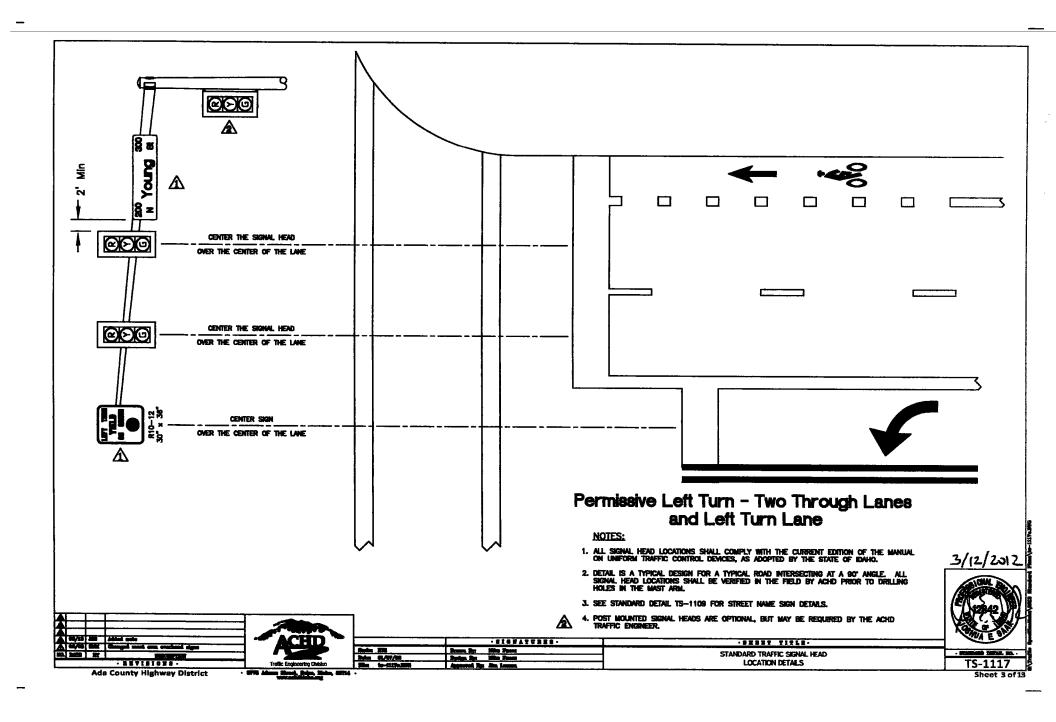
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Profes (CE)		Brogers, Par.	Parket Park			
Date: 81/11/	71	Territor Per	Maryl Pr			
19les to 1111		Approved By:				

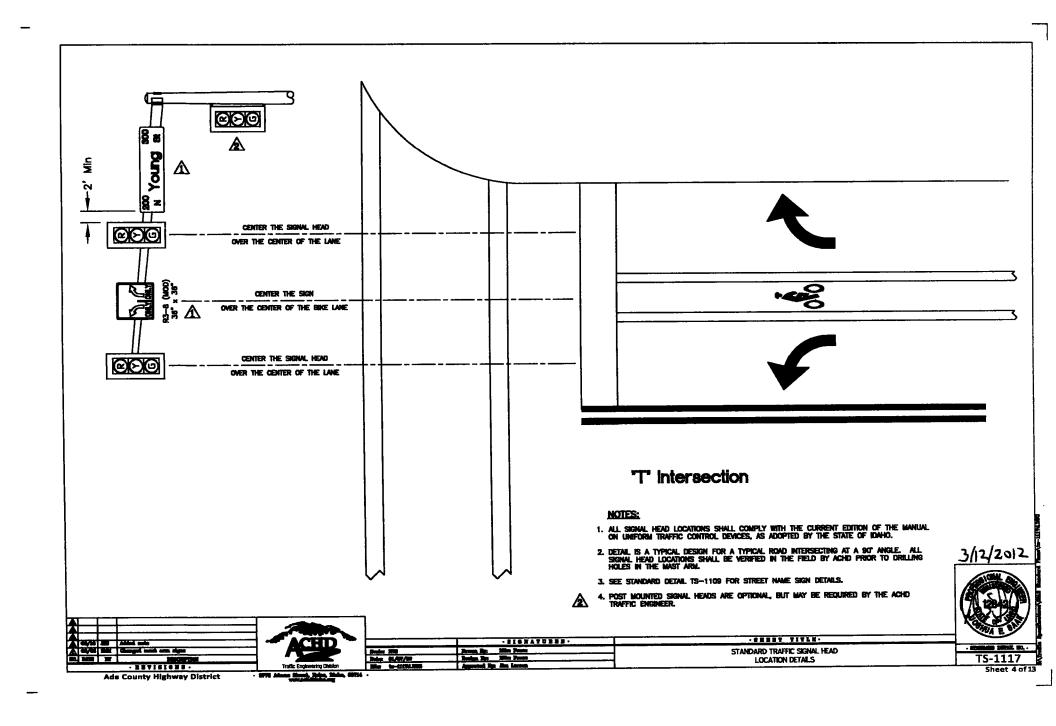
STANDARD ARROWHEAD DETAIL FOR GUIDE AND REGULATORY SIGNS

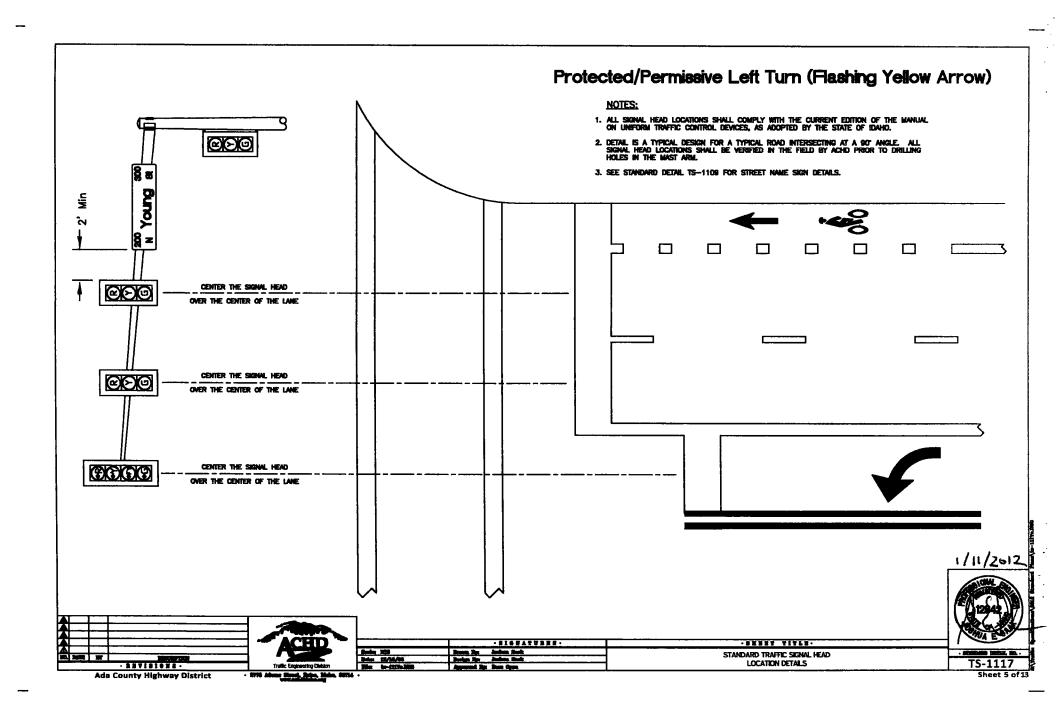
TS-1116 Sheet 1 of 1

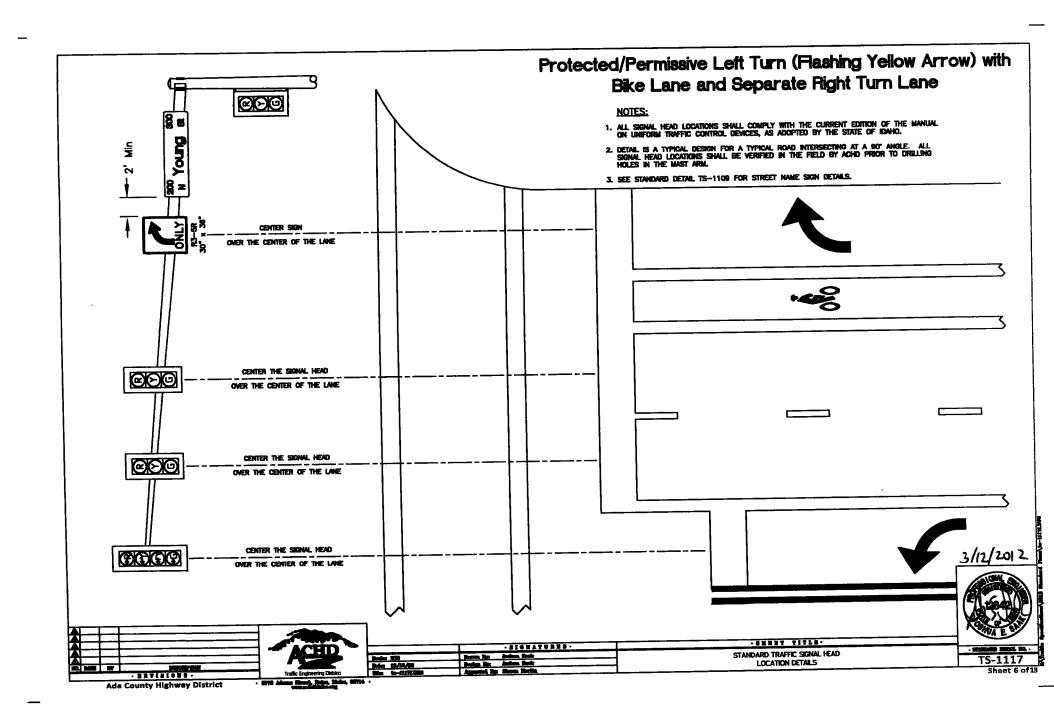


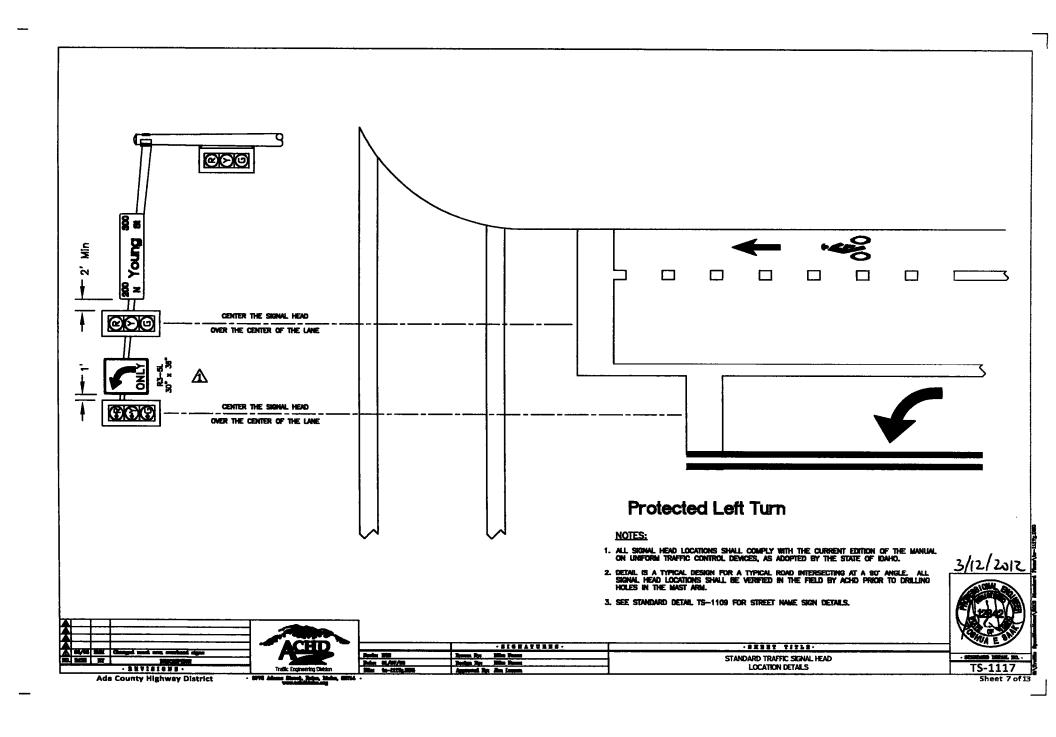


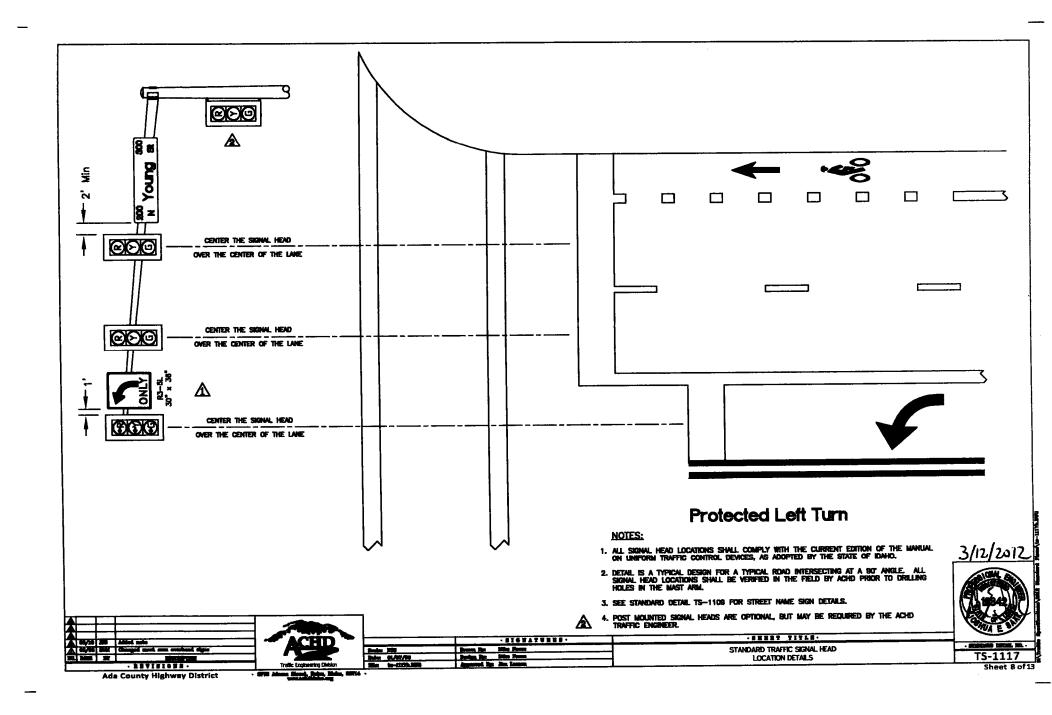


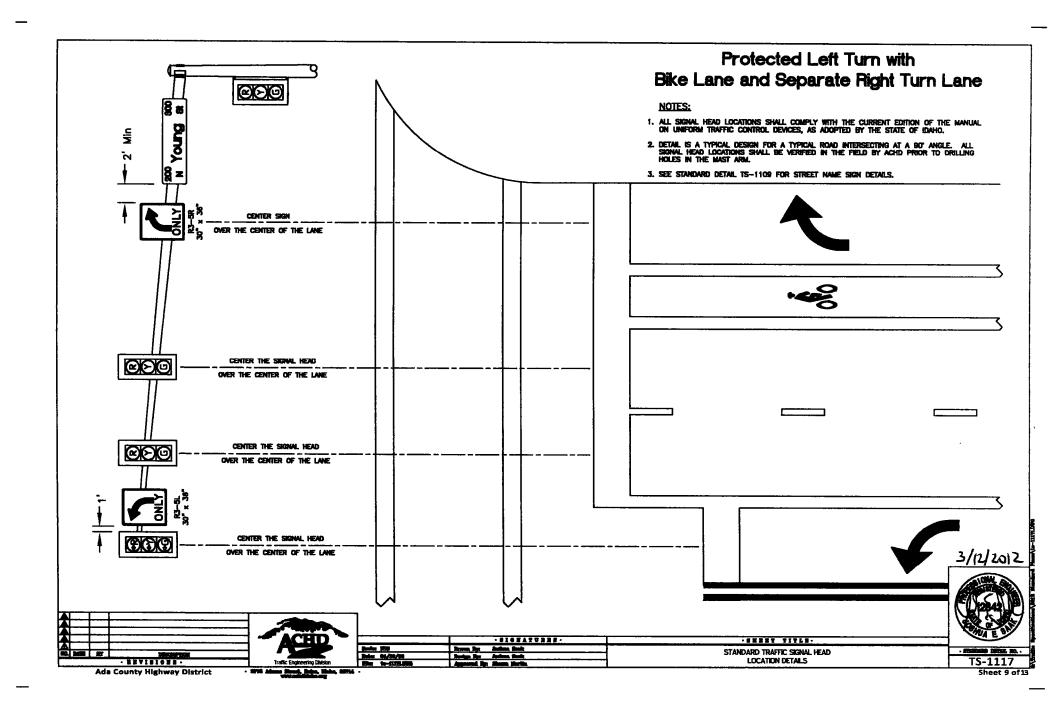


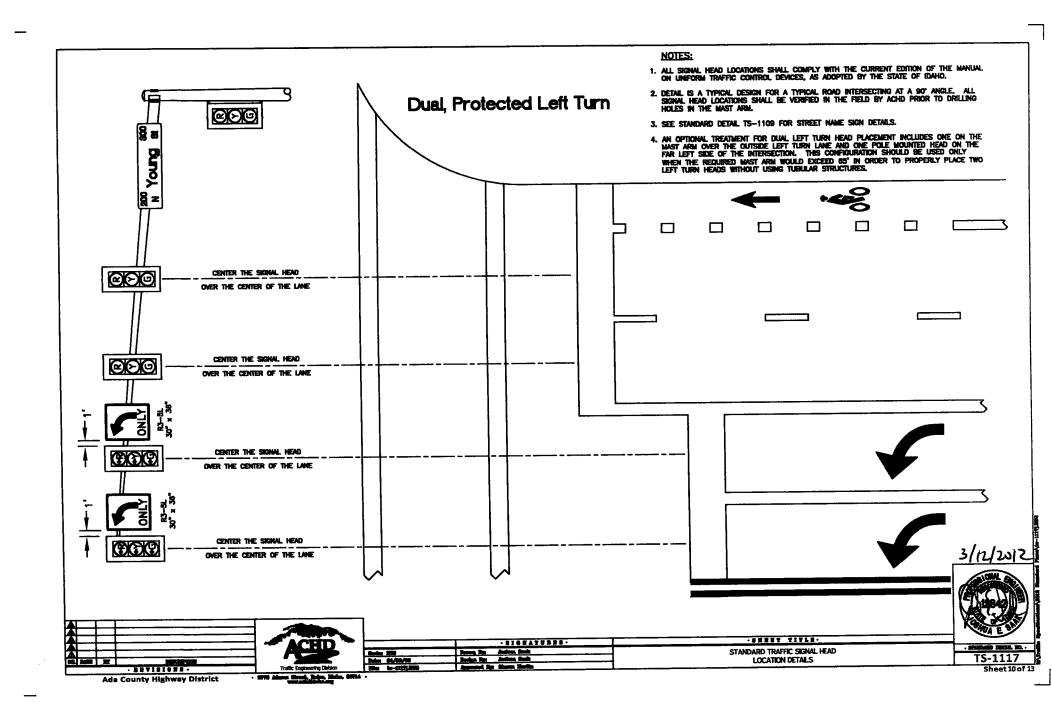








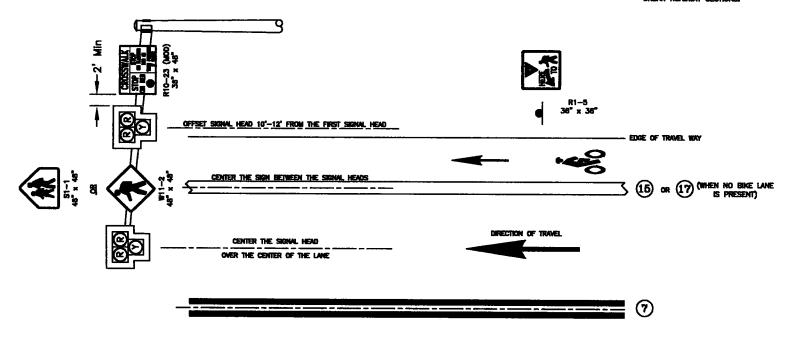




Pedestrian Hybrid Beacon - Two Lane Roadway

DIAGRAM NOTES:

- STOP BARS AND CROSSWALKS ARE NOT SHOWN FOR CLARITY PURPOSES.
- 2. CURB AND GUTTER DETAILS ARE NOT SHOWN, SIGNAL HEAD PLACEMENT IS SIMILAR WITH RESPECT TO RURAL AND URBAN ROADWAY SECTIONS.



GENERAL NOTES:

- ALL SIGNAL HEAD LOCATIONS SHALL COMPLY WITH THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AS ADOPTED BY THE STATE OF IDAHO.
- SCHOOL CROSSING SIGNS SHOULD BE INSTALLED WHEN THE PRIMARY FUNCTION OF THE PEDESTRIAN HYBRID BEACON IS FOR SCHOOL RELATED PEDESTRIAN ACTIVITY. OTHERWISE, PEDESTRIAN SIGNS SHOULD BE INSTALLED.
- REFER TO SIGNAL PLAN SHEETS FOR EXACT PLACEMENT AND INSTALLATION OF SIGNS AND MARKINGS.

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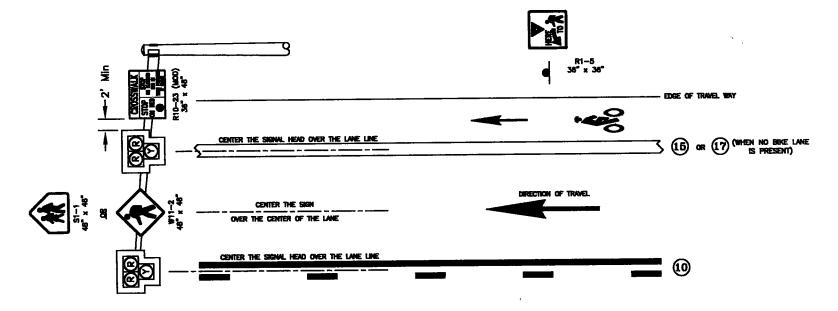
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3/12/2012

Pedestrian Hybrid Beacon - Three Lane Roadway

DIAGRAM NOTES:

- STOP BARS AND CROSSWALKS ARE NOT SHOWN FOR CLARITY PURPOSES.
- 2. CURB AND GUTTER DETAILS ARE NOT SHOWN. SIGNAL HEAD PLACEMENT IS SIMILAR WITH RESPECT TO RURAL AND URBAN ROMOWAY SECTIONS.



GENERAL NOTES:

- ALL SIGNAL HEAD LOCATIONS SHALL COMPLY WITH THE CURRENT EDITION OF THE MANUAL ON UNFORM TRAFFIC CONTROL DEVICES, AS ADOPTED BY THE STATE OF IDAHO.
- SCHOOL CROSSING SIGNS SHOULD BE INSTALLED WHEN THE PRIMARY FUNCTION OF THE PEDESTRUM HYBRID BEACON IS FOR SCHOOL RELATED PEDESTRUM ACTIVITY. OTHERWISE, PEDESTRUM SIGNS SHOULD BE INSTALLED.
- 3. REFER TO SIGNAL PLAN SHEETS FOR EXACT PLACEMENT AND INSTALLATION OF SIGNS AND MARKINGS.

Ada County Highway District

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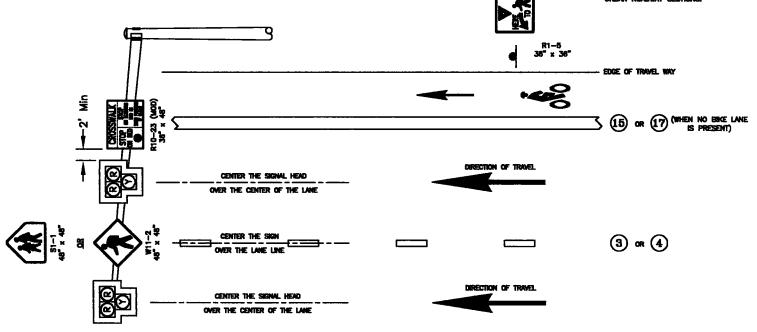
Spales 1755 States 15/30/95 State to-1555.555 Brown Par Johan Brok PEDESTRIAN HYBRID SEACON Brokn Re Johan Brok Pedestrian Hybrid Seacon TRAFFIC Signal Head Details

Sheet 12 of 15

Pedestrian Hybrid Beacon - Four or Five Lane Roadway

DIAGRAM NOTES:

- 1. STOP BARS AND CROSSWALKS ARE NOT SHOWN FOR CLARITY PURPOSES.
- 2. CURB AND GUTTER DETAILS ARE NOT SHOWN, SIGNAL HEAD PLACEMENT IS SIMILAR WITH RESPECT TO RURAL AND URBAN ROADWAY SECTIONS.



GENERAL NOTES:

- ALL SIGNAL HEAD LOCATIONS SHALL COMPLY WITH THE CURRENT EDITION OF THE MANUAL ON UNPOTENT TRAFFIC CONTROL DEVICES, AS ADDITION BY THE STATE OF INDIVID.
- 2. SCHOOL CROSSING SIGNS SHOULD BE INSTALLED WHEN THE PRIMARY FUNCTION OF THE PEDESTRIAN HYBRID BEACON IS FOR SCHOOL. RELATED PEDESTRIAN ACTIVITY. OTHERWISE, PEDESTRIAN SIGNS SHOULD BE INSTALLED.
- 3. REFER TO SIGNAL PLAN SHEETS FOR EXACT PLACEMENT AND INSTALLATION OF SIGNS AND MARKINGS.

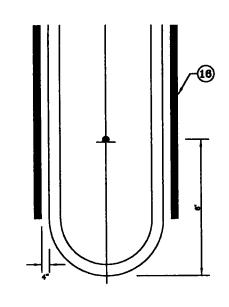
(FOUR LANE OR 6	(FIVE LANE SECTION	N)
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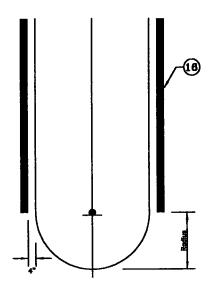
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Ada County Highway District

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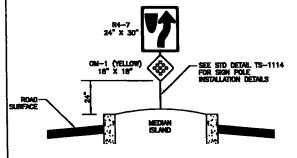


Legend

(16) STRIPING DETAIL NUMBER

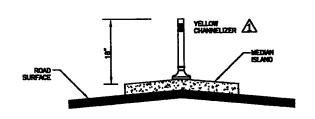
NOTES:

- MEDIANS THAT DO NOT SEPARATE THE DIRECTION OF TRAVEL MAY REQUIRE WHITE PAINT AND MARKERS. COLORS SHALL BE VERIFIED BY THE ACHD TRAFFIC ENGINEER.
- 2. 4" YELLOW STRIPE MAY BE OMITTED IF THE MEDIAN ISLAND IS PAINTED WITH REFLECTIVE YELLOW PAINT.



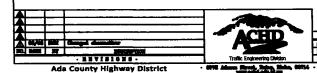
MEDIAN ISLAND DETAIL

(Signing and striping for median Islands greater than or equal to 4' wide.



MEDIAN ISLAND DETAIL

(Signing and striping for median islands between 2' and 4' wide.)



* BIGHATURES* - SERRE TITLES*

STANDARD MEDIAN ISLAND
SIGNING AND STRPING DETAILS
SIGNING AND STRPING DETAILS

10/22/2010

TS-1118 Sheet 1 of 1

